

New species and new records of *Calliotropis* (Gastropoda: Chilodontidae: Calliotropinae) from Indo-Pacific

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ABSTRACT. New records of 25 *Calliotropis* species from the Indo-Pacific area are listed, extending the distribution area of some of them. 30 new species and 1 new subspecies are described and compared with similar *Calliotropis* species : *C. conoeides* n. sp.; *C. helix* n. sp.; *C. cynee* n. sp.; *C. chalkeie* n. sp.; *C. ptykte* n. sp.; *C. solomonensis* n. sp.; *C. pistis* n. sp.; *C. echidnoides* n. sp.; *C. cycloides* n. sp.; *C. pyramoeides* n. sp.; *C. coopertorium* n. sp.; *C. asphales* n. sp.; *C. nux* n. sp.; *C. oros* n. sp.; *C. oros marquisensis* n. ssp.; *C. zone* n. sp.; *C. hysterea* n. sp.; *C. stegos* n. sp.; *C. oregmene* n. sp.; *C. cooperculum* n. sp.; *C. keras* n. sp.; *C. denticulus* n. sp.; *C. dicrous* n. sp.; *C. rostrum* n. sp.; *C. pheidole* n. sp.; *C. siphaeos* n. sp.; *C. nomisma* n. sp.; *C. nomismasimilis* n. sp.; *C. elephas* n. sp.; *C. ostrideslithos* n. sp.; *C. trieres* n. sp.

RESUME. De nouveaux relevés de 25 espèces de *Calliotropis* provenant de la région Indo-Pacifique sont listés, étendant ainsi l'aire de distribution d'un certain nombre d'entre elles. 30 nouvelles espèces et 1 nouvelle sous-espèce sont décrites et comparées avec des espèces similaires de *Calliotropis* : *C. conoeides* n. sp.; *C. helix* n. sp.; *C. cynee* n. sp.; *C. chalkeie* n. sp.; *C. ptykte* n. sp.; *C. solomonensis* n. sp.; *C. pistis* n. sp.; *C. echidnoides* n. sp.; *C. cycloides* n. sp.; *C. pyramoeides* n. sp.; *C. coopertorium* n. sp.; *C. asphales* n. sp.; *C. nux* n. sp.; *C. oros* n. sp.; *C. oros marquisensis* n. ssp.; *C. zone* n. sp.; *C. hysterea* n. sp.; *C. stegos* n. sp.; *C. oregmene* n. sp.; *C. cooperculum* n. sp.; *C. keras* n. sp.; *C. denticulus* n. sp.; *C. dicrous* n. sp.; *C. rostrum* n. sp.; *C. pheidole* n. sp.; *C. siphaeos* n. sp.; *C. nomisma* n. sp.; *C. nomismasimilis* n. sp.; *C. elephas* n. sp.; *C. ostrideslithos* n. sp.; *C. trieres* n. sp.

INTRODUCTION

Numerous species belong to the genus *Calliotropis* : about 50 valid species live in the only Indo-Pacific area. Most of these species live at rather great depth (few hundred meters), some species even living in greater depth (over 1000 m). So, it is understandable that some new species have been discovered only recently during new deep water dredging campaigns (Rehder et Ladd, 1973; Marshall, 1979; Lan, 1990; Jansen, 1994; Lee & Wu, 2001; Vilvens, 2004, 2005, 2006; Poppe et al., 2006). In the same way, the distribution area of well-known species, primitively rather restricted, has been extended to other areas, sometimes far away from the original locality.

For the last twenty years, numerous French expeditions conducted by the IRD (Institut de Recherche pour le Développement, Paris - ex-ORSTOM) and the MNHN (Muséum national d'Histoire naturelle, Paris) have taken place in a large Indo-Pacific area, from Taiwan, Indonesia and Philippines to Solomon Islands, New Caledonia, Fiji,

Vanuatu and even far away up to Tonga and Marquesas Islands. They have brought a huge deep water material of highly scientific interest, among others various trochids, especially *Calliotropis* species. Some new species have already been described from this material (Vilvens, 2004, 2005, 2006; Poppe et al., 2006). The present paper propose a synthetic report on most of the species of *Calliotropis* collected during these French expeditions, describing 30 new species (and 1 new subspecies) and extending the distribution area of 25 known species. The variability of some of these species is discussed here. A list of the Recent *Calliotropis* species of the Indo-Pacific area, with their respective distribution, is also provided as appendix at the end of this paper.

Material and methods. The material studied in this paper was brought by French IRD-MNHN expeditions in a large Indo-Pacific area, covering mainly Taiwan, Indonesia, Solomon Islands, New Caledonia, Fiji, Vanuatu, Tonga and Marquesas Islands. The following table lists these campaigns :

Campaign	Prospecting area	Date (m/y)
VAUBAN 1978-79	New Caledonia	1978-1979
LAGON	New Caledonia	5,8-12/1984
CHALCAL 1	Chesterfield plateau	7/1984
BIOCAL	Southern New Caledonia and Iles Loyauté	8-9/1985
MUSORSTOM 4	New Caledonia	9-10/1985
SMIB 1	Southern New Caledonia	2/1986
SMIB 2	Southern New Caledonia	9/1986
MUSORSTOM 5	Chesterfield Is., Guyots of Lord Howe ridge	10/1986
CHALCAL 2	Southern New Caledonia and Norfolk ridge	10-11/1986
BIOGEOCAL	Loyalty Basin	4-5/1987
SMIB 3	Southern New Caledonia and Norfolk ridge	5/1987
CORAIL 2	Chesterfield Is., Lansdowne and Fairway banks	7-8/1988
MUSORSTOM 6	Loyalty ridge	2/1989
VOLSMAR	Loyalty Ridge	5-6/1989
SMIB 5	Loyalty Ridge	9/1989
CALSUB	Iles Loyauté	2-3/1989
SMIB 6	New Caledonia	3/1990
KARUBAR	Indonesia	10-11/1991
BERYX 11	Norfolk Ridge and Loyalty Ridge	10/1992
SMIB 8	Norfolk Ridge	1-2/1993
BATHUS 1	Eastern New Caledonia	3/1993
BATHUS 2	Southern New Caledonia	5/1993
MONTROUZIER	New Caledonia, Koumac sector	10/1993
BATHUS 3	New Caledonia, Norfolk Ridge	11/1993
HALIPRO 1	Southern New Caledonia	3/1994
BATHUS 4	New Caledonia	8/1994
MUSORSTOM 8	Vanuatu	9-10/1994
HALICAL 1	New Caledonia	11-12/1994
HALIPRO 2	Norfolk Ridge and Loyalty Ridge	11/1996
MUSORSTOM 9	Marquesas Islands	8-9/1997
MUSORSTOM 10	Fiji Islands	8/1998
BORDAU 1	Fiji Islands	2-3/1999
PALEO-SURPRISE	Northern New Caledonia	4-5/1999
LITHIST	Southern New Caledonia	8/1999
BORDAU 2	Tonga Islands	6/2000
TAIWAN 2000	Taiwan	7-8/2000
LIFOU 2000	Iles Loyauté	10-11/2000
NORFOLK 1	New Caledonia, Norfolk Ridge	6/2001
SALOMON 1	Solomon Islands	9/2001

Table 1. – List of the Indo-Pacific MNHN campaigns mentioned.

Regarding the MNHN campaigns throughout Ocean (BENTHEDI, MD-32...), see Vilvens (2005 & Philippines (MUSORSTOM 1-2-3, ESTASE), see 2006).
 Poppe et al. (2006) and in the south-western Indian



Map 1 : Prospecting areas surveyed in this paper - approximative locations :

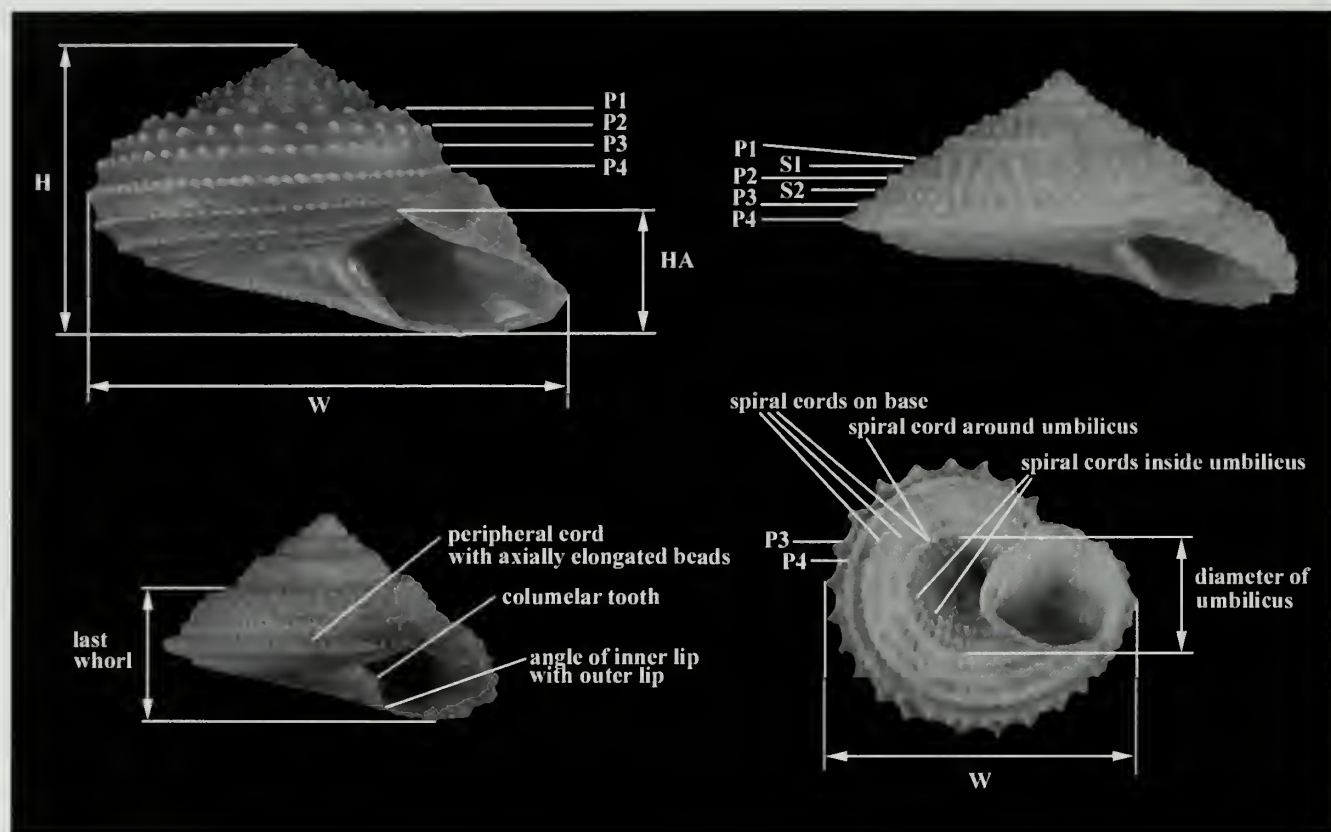
- ◆ : TAIWAN 2000;
- : KARUBAR;
- ★ : SALOMON 1;
- : MUSORSTOM 8;
- ⊙ : MUSORSTOM 10, BORDAU 1;
- ◻ : MUSORSTOM 9;
- ⊗ : BORDAU 2;
- ⊕ : CHALCAL 1, MUSORSTOM 5, CORAIL 2;
- ⊗ : PALEO-SURPRISE;
- * : LAGON, BIOCAL, MUSORSTOM 4, SMIB 1, SMIB 2, BIOGEOCAL, MUSORSTOM 6, VOLSMAR, SMIB 5, CALSUB, SMIB 6, BATHUS 1, BATHUS 2, MONTROUZIER, BATHUS 3, HALIPRO 1, BATHUS 4, HALICAL 1, LITHIST, LIFOU 2000, NORFOLK 1;
- ⊗ : CHALCAL 2, SMIB 3, BERYX 11, SMIB 8, HALIPRO 2.

Regarding the distribution of the new species and the extension of the distribution of known species, the range is taken from the internal intervals of the two extremes values.

As for the description methodology, the main conchological features used are (see sch. 1 below) :

♦ general shape of the shell (depressed, high spired - cyrtococonoidal, conical, coeloconoidal);

- ♦ shape of the whorls (convex, concave, straight - with or without shoulder or keel);
- ♦ spiral cords of the whorls (ontogeny, number, beads, distance between);
- ♦ spiral cords on the base (number, beads, distance between);
- ♦ spiral cords within the umbilicus (number);
- ♦ shape of the aperture, the outer and inner lip.



Schema 1 : Useful features of *Calliotropis* shells; H : height; W : width; HA : height of the aperture; P1, P2, P3, ... : primary cords; S1, S2, S3, ... : secondary cords.

Considering the relatively poor anatomical information about *Calliotropis* species, no subgenus has been described on such considerations. So by now only conchological features was used to define subgenera. In original descriptions we can only find the subgenera *Solaricida* Dall, 1919 (characterized by a depressed spire and a broad umbilicus - although the type species *Solariella* (*Solaricida*) *hondoensis* Dall, 1919 has precisely a not so wide umbilicus) and *Adamsenida* Habe, 1952 (with *Enida gemmulosa* A.Adams, 1860 as type species - this subgenus is vaguely characterized by strong spiral cords on whorls, a convex base and a wide umbilicus). Poppe et al. (2006) described 2 new subgenera : *Schepmanotropis* (type species : *Solariellopsis*

calcarata Schepman, 1908) and *Spinicalliotropis* (type species : *C. spinosa* Poppe, Tagaro & Dekker, 2006). This survey neither defines new subgenera nor uses existent ones because the range of variations of *Calliotropis* shells seems too wide to allow the use of only conchological features without anatomical (especially radula) considerations.

Species are here listed following on an order based upon the height (H) and the height/width ratio (H/W) of the shell (using the mean of these values computed for available specimens). So eight formal groups can be distinguished : large ($H \geq 15$ mm), rather small ($6 \leq H < 15$ mm) and small shells ($H < 6$ mm) with an elevated spire ($H/W \geq 1$), large and rather small shells with a rather elevated spire ($0.7 < \text{ratio} < 1$), and rather

small and small shells with a rather depressed spire (ratio \leq 0.7). Within each group, the known species are listed before the related new species, so that the comparisons in descriptions of new species could be

easier to understand. Such an order may look arbitrary, but it helps to locate the different species through the paper. More precisely :

species	H (mm)	H/W	page
Formal group 1 : large shell ($H \geq 15$) with elevated spire ($H/W \geq 1$)			
<i>Calliotropis pagodiformis</i> (Schepman, 1908)	23.5	1.15	p.7
<i>Calliotropis conoeides</i> n. sp.	31.5	1.24	p.7
<i>Calliotropis excelsior</i> Vilvens, 2004	24.4	1.18	p.8
<i>Calliotropis helix</i> n. sp.	19.8	1.05	p.8
<i>Calliotropis cynee</i> n. sp.	16.2	1.18	p.10
<i>Calliotropis infundibulum</i> (Watson, 1879)	20	1.04	p.11
<i>Calliotropis hataii</i> Rehder & Ladd, 1973	16	1	p.12
Formal group 2 : rather small shell ($6 \leq H < 15$) with elevated spire ($H/W \geq 1$)			
<i>Calliotropis chalkeie</i> n. sp.	6.5	1.26	p.12
Formal group 3 : small shell ($H < 6$) with elevated spire ($H/W \geq 1$)			
<i>Calliotropis acherontis</i> Marshall, 1979	5.2	1.42	p.15
<i>Calliotropis crystallophora</i> Marshall, 1979	4.5	1.33	p.15
<i>Calliotropis ptykte</i> n. sp.	4.1	1.31	p.16
<i>Calliotropis lamellifera</i> Jansen, 1994	4.8	1.19	p.18
<i>Calliotropis multisquamosa</i> (Schepman, 1908)	5.5	1.1	p.20
<i>Calliotropis solomonensis</i> n. sp.	4.5	1.09	p.20
<i>Calliotropis echidnoides</i> n. sp.	4.8	1.02	p.22
<i>Calliotropis stanyii</i> Poppe, Tagaro & Dekker, 2006	5.5	1	p.23
Formal group 4 : large shell ($H \geq 15$) with moderately elevated spire ($0.7 < H/W < 1$)			
<i>Calliotropis derbiosa</i> Vilvens, 2004	22.3	0.9	p.24
<i>Calliotropis micraulax</i> Vilvens, 2004	20.5	0.9	p.24
<i>Calliotropis midwayensis</i> (Lan, 1990)	21.3	0.89	p.24
<i>Calliotropis asphales</i> n. sp.	23.8	0.87	p.26
<i>Calliotropis glypta</i> (Watson, 1879)	20	0.86	p.28
<i>Calliotropis basileus</i> Vilvens, 2004	21.8	0.85	p.28
Formal group 5 : rather small shell ($6 \leq H < 15$) with moderately elevated spire ($0.7 < H/W < 1$)			
<i>Calliotropis blacki</i> Marshall, 1979	11.5	0.86	p.28
<i>Calliotropis pistis</i> n. sp.	10.1	0.8	p.29
<i>Calliotropis boucheti</i> Poppe, Tagaro & Dekker, 2006	12.7	0.76	p.30
<i>Calliotropis dicrous</i> n. sp.	10.2	0.81	p.30
<i>Calliotropis scalaris</i> Lee & Wu, 2001	6	0.75	p.32
<i>Calliotropis denticulus</i> n. sp.	7.4	0.73	p.33
Formal group 6 : small shell ($H < 6$) with moderately elevated spire ($0.7 < H/W < 1$)			
<i>Calliotropis delli</i> Marshall, 1979	5.6	0.99	p.34
<i>Calliotropis pyramoeides</i> n. sp.	3.6	0.95	p.36

<i>Calliotropis coopertorium</i> n. sp.	2.9	0.83	p.37
<i>Calliotropis oros</i> n. sp.	5.4	0.78	p.38
<i>Calliotropis hysterea</i> n. sp.	5.8	0.77	p.40
<i>Calliotropis zone</i> n. sp.	4.8	0.77	p.41
<i>Calliotropis oreguene</i> n. sp.	5.7	0.76	p.43
<i>Calliotropis cycloides</i> n. sp.	5	0.73	p.44
Formal group 7 : rather small ($6 \leq H < 15$) shell with rather depressed spire ($H/W \leq 7$)			
<i>Calliotropis eucheloides</i> Marshall, 1979	8.5	0.7	p.46
<i>Calliotropis nux</i> n. sp.	11	0.7	p.49
<i>Calliotropis limbifera</i> (Schepman, 1908)	7.4	0.69	p.50
<i>Calliotropis pulchra</i> (Schepman, 1908)	7.9	0.55	p.52
<i>Calliotropis oros marquisensis</i> n. ssp.	7	0.67	p.52
<i>Calliotropis keras</i> n. sp.	13.6	0.64	p.52
<i>Calliotropis elephas</i> n. sp.	8.3	0.63	p.54
<i>Calliotropis rostrum</i> n. sp.	8.7	0.57	p.56
<i>Calliotropis nomisma</i> n. sp.	10.2	0.55	p.57
Formal group 8 : small shell ($H < 6$) with rather depressed spire ($H/W \leq 7$)			
<i>Calliotropis bucina</i> Vilvens, 2006	3.8	0.68	p.58
<i>Calliotropis stegos</i> n. sp.	5	0.66	p.58
<i>Calliotropis cooperulum</i> n. sp.	5	0.66	p.59
<i>Calliotropis trieres</i> n. sp.	2.9	0.63	p.62
<i>Calliotropis vilvensi</i> Poppe, Tagaro & Dekker, 2006	2.7	0.56	p.63
<i>Calliotropis siphaios</i> n. sp.	5.2	0.59	p.63
<i>Calliotropis calcarata</i> (Schepman, 1908)	5.2	0.58	p.64
<i>Calliotropis ostrideslitios</i> n. sp.	3.8	0.58	p.64
<i>Calliotropis nomismasimilis</i> n. sp.	5.2	0.57	p.65
<i>Calliotropis phleidole</i> n. sp.	2.7	0.53	p.68
<i>Calliotropis spinulosa</i> (Schepman, 1908)	4.3	0.49	p.67

Table 2. – List of the species mentioned.

Abbreviations**Repositories**

AMS : Australian Museum, Sydney, Australia.
 IRSNB : Institut royal des Sciences naturelles de Belgique, Bruxelles, Belgium.
 MNHN : Muséum national d'Histoire naturelle, Paris, France.
 MZB : Museum Zoologicum Bogoriense, Bogor, Indonesia.
 NHM : Natural History Museum, London, England.
 NMNZ : National Museum of New Zealand Te Papa Tongarewa, Wellington, New Zealand.

NTOU : National Taiwan Ocean University, Taiwan.
 RMBR : Raffles Museum of Biodiversity Research, Singapore.

ZMA : Zoölogisch Museum, Amsterdam, The Netherlands.

Other abbreviations

H : height.
 W : width.
 HA : height of the aperture.
 TW : number of teleoconch whorls.
 P1, P2, P3, : primary cords (P1 is the most adapical).
 S1, S2, S3, : secondary cords (S1 is the most adapical).

stn : station.

lv : live-taken specimens present in sample.

dd : no live-taken specimens present in sample.

sub : subadult specimen.

juv : juvenile specimen .

SYSTEMATICS

We follow here the classification of Bouchet & Rocroi (2005), where Calliotropini, earlier treated as a tribe of Trochidae (Hickman & McLean, 1990), are now ranked as a subfamily of family Chilodontidae.

Superfamily : **SEGUENZIOIDEA** Verrill, 1884

Family : **CHILODONTIDAE** Wenz, 1938

Subfamily : **CALLIOTROPINAE** Hickman & McLean, 1990

Genus: *Calliotropis* Seguenza, 1903

Type species: *Trochus otto* Philippi, 1844 (by original designation) - Pliocene-Pleistocene, Italy.

Calliotropis pagodiformis (Schepman, 1908)

Figs 1-5

Solariellopsis pagodiformis Schepman, 1908: 60-61, pl. V, fig. 2. Type locality: Indonesia, 2°40'S-10°48.6'S, 128°37.5'E-123°23.1'E, 835-918 m.

Other reference :

Calliotropis pagodiformis - Vilvens, 2004: 28, figs 23-24.

Material examined. Indonesia (Tanimbar Islands).

KARUBAR: stn CP54, 08°21'S, 131°43'E, 836-869 m, 1 dd. - Stn CP72, 08°36'S, 131°33'E, 699-676 m, 2 dd. - Stn CP87, 08°47'S, 130°49'E, 1017-1024 m, 2 dd. - Stn CP91, 08°44'S, 131°05'E, 884-891 m, 6 lv. - **Solomon Islands. SALOMON 1:** stn CP1750, 9°15.6'S, 159°54.6'E, 693-696 m, 25 dd. - Stn CP1751, 9°10.4'S, 159°53'E, 749-799 m, 12 dd, 1 dd sub, 3 dd juv. - Stn CP1806, 9°37.0'S, 160°49.7'E, 621-708 m, 1 dd, 1 dd sub. - Stn CP1808, 9°45.5'S, 160°52.5'E, 611-636 m, 1 dd, 1 dd juv. - Stn CP1858, 9°37.0'S, 160°41.7'E, 435-461 m, 4 dd & 5 dd sub.

Distribution. Indonesia, alive in 884-891 m, shells in 835-918 m (range computed using also data of Schepman, 1908); Solomon Islands, 461-749 m.

Remarks. This species was described from Indonesia and the records in Solomon Islands are new, giving a distribution that is provisionally disjoint.

Calliotropis conoeides n. sp.

Figs 6-9, Table 3

Type material. Holotype (31.3 x 25.2 mm) MNHN (9836). Paratypes: 3 MNHN (9837), 1 coll. C.Vilvens.

Type locality. Solomon Islands, SALOMON 1, stn CP1754, 9°00.1'S, 159°49.0'E, 1169-1203 m.

Material examined. Solomon Islands. SALOMON 1: stn CP1754, 9°00.1'S, 159°49.0'E, 1169-1203 m, 5 lv (holotype and 4 paratypes), 3 dd sub, 2 dd juv. - Stn CP1755, 8°58.2'S, 159°41.6'E, 1288-1313 m, 1 dd. - Stn CP1764, 8°36.6'S, 160°07.4'E, 1327-1598 m, 1 lv.

Distribution. Solomon Islands, alive in 1203-1327 m.

Diagnosis. A *Calliotropis* species with high spire, conical shape, whitish, with 2 spiral cords on spire whorls, the granules of the abapical cord the strongest; 2 peripheral granular cords and a very weak subsutural third granular cord on last whorl; 4 granular spiral cords on base; no umbilicus.

Description. *Shell* tall for the genus (height up to 31.5 mm, width up to 25.2 mm), higher than wide, rather thin, conical; spire high, height 1.2x to 1.3x width, 3.2x to 3.5x aperture height; without umbilicus.

Protoconch about 400 µm, of about 1 whorl, smooth, bulbous, with a weak, poorly visible, terminal varix.

Teleoconch up to 9.6 slightly convex whorls, bearing 3 spiral granular cords and prosocline threads; nodules from cords produced by intersections with axial threads on 5 first whorls.

Suture visible, not canaliculated.

First whorl convex, sculptured by about 20 weakly prosocline smooth ribs, interspace between ribs 2x broader than ribs; primary spiral cord P3 appearing almost immediately, P1 appearing about half a whorl later, weaker than P3, both bearing rounded nodules; P2 absent. On next three whorls, P1 and P3 stronger, P1 still weaker than P3; nodules of P3 sharp; interspace between axial ribs becoming 3x broader than ribs. On fifth whorl, P4 weakly emerging from suture, with nodules smaller and more numerous than nodules of P1 and P3; axial ribs becoming weaker. On sixth whorl, P1 becoming weaker, with blunt nodules; axial ribs obsolete. On seventh whorl, P1 becoming obsolete, only poorly visible; nodules of P3 large, prickly, isolated. On last whorl, P1 very weak, almost disappearing on some specimens; P3 the strongest; P4 fully visible, peripheral, with small sharp nodules four times more numerous than nodules of P3.

Aperture subelliptic, weakly flaring on the largest specimens; outer lip rather thin, indented by external spiral cords, producing an angle with inner lip, this angle obtuse on the largest specimens.

Columella slightly curved, slightly prosocline, without tooth.

Base moderately convex, with 4 granular spiral cords; innermost one stronger than others, with strong nodules, bordering umbilical area; distance between cords 3x broader than cords; numerous thin, weak, crowded axial lamellate threads between cords.

Colour of teleoconch hazel beige, without maculation; protoconch whitish.

	TW	H	W	HA	H/W	H/HA
holotype	9.6	31.3	25.2	9.7	1.24	3.23
paratype MNHN 1	8.5	24.1	18.6	6.9	1.30	3.49
paratype MNHN 2	7.8	24.2	20.2	7.4	1.20	3.27
paratype MNHN 3	7.8	18.8	15.9	5.7	1.18	3.30
paratype CV	8.8	25.1	20.4	7.2	1.23	3.49
specimen CPI764	9.0	31.5	25.1	9.7	1.25	3.25

Table 3. - *Calliotropis conoeides*: Shells measurements in mm for types and bigger specimen.

Discussion. *Calliotropis conoeides* n. sp. is close to *C. pagodiformis* (Schepman, 1908) (Figs 1-5) from Indonesia and Solomon Islands, but this species has a less slender shape, a much more channelled suture, the sharp nodules of P1 clearly visible and adapically oriented on the last whorls.

Regarding the spiral cords on whorls and base, the new species remembers also *C. minorusaitoi* Poppe, Tagaro & Dekker, 2006 from Philippines, but this species is similar in size for less numerous whorls, has a globose, not conical, shape and a wide umbilicus.

C. conoeides n. sp. is close to *C. philippeii* Poppe, Tagaro & Dekker, 2006 from Philippines, but this species has an area between P1 and P2 with a convex shape, giving a cyrtconoidal, not conical, shape to the shell, has a much weaker P1 cord, more numerous and more closely packed spiral cords on the base and seems (regarding the plate of the original description) to have an open wide umbilicus.

Etymology. Conical (Greek: κωνοειδής) - with reference to the general shape of the shell.

Calliotropis excelsior Vilvens, 2004
Figs 10-11

Calliotropis excelsior Vilvens, 2004: 26-30, figs 19-22. Type locality: Fiji, 17°42.6'S, 178°55.0'E, 959-963 m.

Material examined. New Caledonia. BIOCAL: stn CP26, 22°40'S, 166°27'E, 1618-1740 m, 2 dd. - Stn CP57. 23°44'S, 166°58'E, 1490-1620 m, 2 dd. - BIOGEOCAL: stn CP214, 22°43'S, 166°28'E, 1590-1665 m, 1 dd & 1 dd juv. - BATHUS 4: stn DW915, 18°51'S, 163°17'E, 575-580 m, 3 dd. - **Fiji.** MUSORSTOM 10: stn CP1354, 17°42.6'S, 178°55.0'E, 959-963 m, 1 dd sub.

Distribution. Fiji, 959-963 m and New Caledonia, 1000-1120 m (range computed using also data of Vilvens, 2004).

Remarks. This species was described from Fiji and New Caledonia. The new records only confirm its distribution.

Calliotropis helix n. sp.
Figs 12-15, Table 4

Type material. Holotype (19.6 x 19.4 mm) NTOU. Paratype MNHN (9838).

Type locality. Taiwan, South China Sea, TAIWAN 2000, stn CP30, 22°16.0'S, 120°15.8'E, 790 m.

Material examined. Taiwan. TAIWAN 2000: stn CP23, 22°11.9'S, 120°02.9'E, 876 m, 2 dd. - Stn CP30, 22°16.0'S, 120°15.8'E, 790 m, 2 lv (holotype and paratype). - Stn CP32, 22°01.7'S, 120°16.4'E, 904 m, 1 dd.

Distribution. Taiwan, South China Sea, alive at 790 m, shells in 790-904 m.

Diagnosis. A *Calliotropis* species with high spire, conical shape, brownish, with 2 spiral cords on spire whorls, the abapical prominent cord the strongest; 3 spiral cords on last whorl; base with 3 almost smooth spiral cords and an inner granular cord around the closed umbilicus.

Description. *Shell* rather tall for the genus (height up to 19.8 mm, width up to 19.4 mm), higher than wide, thin, conical; spire high, height 1.0x to 1.1x width, 2.7x to 3.0x aperture height; umbilicus closed.

Protoconch from 300 to 400 µm, of about 1 whorl, smooth, glassy, with only a weak, poorly visible, terminal line.

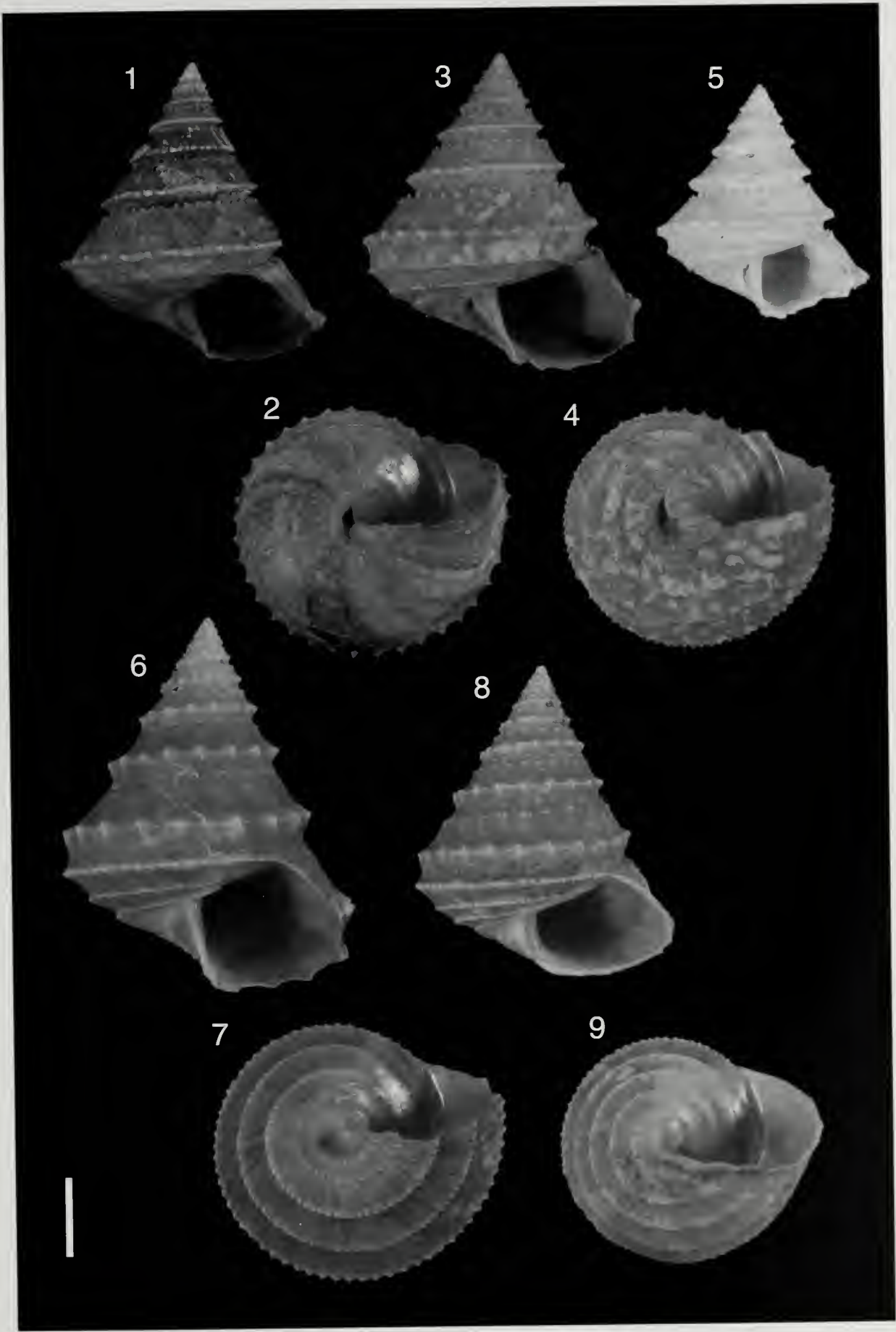
Figures 1-9. Scale bar = 5 mm.

1-5. *Calliotropis pagodiformis* (Schepman, 1908).

1-2. MNHN, Indonesia, 884-891 m [KARUBAR, stn CP91], 20.2 x 18.2 mm; **3-4.** MNHN, Solomon Is., 749-799 m [SALOMON 1, stn CP1751], 21.4 x 17.6 mm; **5.** Syntype ZMA (3.08.065), Indonesia, 14.1 x 12.7 mm.

6-9. *C. conoeides* n. sp., Solomon Is., 1169-1203 m [SALOMON 1, stn CP1754].

6-7. Holotype MNHN (9836), 31.3 x 25.2 mm; **8-9.** Paratype MNHN (9837), 24.1 x 18.6 mm.



Teleoconch up to 8 slightly convex whorls, bearing 3 spiral granular cords and prosocline threads; nodules from cords produced by intersections with axial threads on 4 first whorls.

Suture visible, not canaliculated.

First whorl convex, sculptured by about 20 weakly prosocline smooth ribs, interspace between ribs 1.5x broader than ribs; primary spiral cords P1 and P3 appearing almost immediately, bearing rounded nodules; P1 weaker than P3; P2 absent. On second whorl, P3 still stronger than P1; nodules of cords becoming sharp; P4 emerging from suture at the end of the whorl, weaker than P1, with nodules smaller and more numerous than nodules of P1 and P3. On succeeding whorls, nodules of P3 sharp, separated and horizontally oriented; nodules of P1 weaker than those of P3, separated, oriented at an angle of 45°; axial ribs visible on second and third whorl, interspace between twice as broad as them; ribs obsolete at fourth whorl, disappearing on next whorls. On last whorl, nodules of P1 becoming blunt; nodules of P3 very strong and

sharp; P4 fully visible, peripheral, with sharp nodules, smaller and more numerous than nodules of P1.

Aperture elliptic, slightly transverse; outer lip rather thin, indented by external spiral cords, without angle with inner lip.

Columella slightly curved, prosocline, without tooth.

Base convex, with 4 spiral cords; 3 outermost cords thin, smooth or only weakly subgranular; innermost one stronger than the others, granular with strong nodules, bordering umbilical area; distance between cords at least 4x broader than cords; obsolete axial lamellate threads between cords.

Umbilicus moderately wide, diameter measuring ca. 20% of shell width, funnel shaped, closed by columellar callus; crowded thin axial lamellae on parts of wall not covered by callus.

Colour of teleoconch terracotta, without maculation; protoconch off-white.

Operculum corneous, multispiral with a short growing edge.

	TW	H	W	HA	H/W	H/HA
holotype	7.8	19.6	19.4	6.9	1.01	2.84
paratype MNHN	8.0	19.8	18.1	6.5	1.09	3.05
specimen CP23 / 1	5.0	11.4	11.3	3.8	1.01	3.00
specimen CP23 / 2	6.0	10.8	10.1	3.7	1.07	2.92
specimen CP32	6.7	11.3	10.4	4.2	1.09	2.69

Table 4. - *Calliotropis helix* : Shells measurements in mm for types and specimens.

Discussion.

Calliotropis helix n. sp. is close to *C. pagodiformis* (Schepman, 1908) (Figs 1-5) from Indonesia and Solomon Islands, but this species has a more slender shape, a more channelled suture, the sharper nodules of P1 adapically oriented on all the whorls and narrower umbilicus partially open.

The new species may also be compared to *C. conoeides* n. sp. (Figs 6-9) from Solomon Islands, but this species is more slender (ratio H/W of 1.2 to 1.3 instead of 1.0 to 1.1) and has the nodules of P1 still clearly visible on the last whorls, the 3 outermost spiral of cords distinctly granular and no umbilicus.

Etymology. Screw (Greek : ἐλῆξ), used as a noun in apposition - with reference to the shape of the shell.

Calliotropis cynee n. sp.

Figs 16-19, Table 5

Type material. Holotype (16.2 x 13.1 mm) MNHN (9839). Paratypes: 6 MNHN (9840), 2 MZB (Gst. 13.638), 1 coll. C.Vilvens.

Type locality. Indonesia, Tanimbar Islands, KARUBAR, stn CP89, 08°39'S, 131°08'E, 1084-1058 m.

Material examined. Indonesia. KARUBAR: stn CP52, 08°03'S, 131°48'E, 1244-1266 m, 2 dd. - Stn CP89, 08°39'S, 131°08'E, 1084-1058 m, 10 dd (holotype and paratypes), 8 dd sub, 2 dd juv - Stn CP91, 08°44'S, 131°05'E, 884-891 m, 4 dd.

Distribution. Indonesia, Tanimbar Islands, 891-1244 m.

Diagnosis. A *Calliotropis* species with high spire, conical shape, silvery, with 2 spiral cords on spire whorls, the abapical prominent cord the strongest, the adapical one vanishing on last whorls; a third thin spiral cord peripheral on last whorl; base with 2 nearly smooth spiral cords and an inner granular cord around the umbilicus; no spiral cord within the umbilicus.

Description. *Shell* of medium size for the genus (height up to 16.2 mm, width up to 13.4 mm), higher than wide, thin, conical; spire high, height 1.1x to 1.2x width, 2.5x to 3.0x aperture height; umbilicus deep and rather large.

Protoconch from 250 to 300 µm, of 1 whorl, smooth, glassy, with only a weak, poorly visible, terminal line. *Teleoconch* up to 7.8 slightly convex whorls, bearing 3 spiral granular cords and prosocline threads; nodules from cords produced by intersections with axial threads on 3 first whorls. Suture visible, not canaliculated. First whorl convex, sculptured by about 20 weakly prosocline smooth ribs, interspace between ribs 1.5x broader than ribs; primary spiral cords P1 and P3 appearing almost immediately, bearing rounded nodules; P1 slightly weaker than P3; P2 absent. On second whorl, P3 still stronger than P1; nodules of both cords sharp. On succeeding whorls, nodules of P3 sharp, separated and horizontally oriented; nodules of P1 also sharp but weaker than those of P3, separated, oriented at an angle of 45°; axial ribs visible on second and third whorl, interspace three times as broad as them; ribs becoming obsolete at fourth whorl, disappearing on next whorls. On sixth (or fifth for some specimens) whorl, nodules of P1

blunt; nodules of P3 still strong and sharp; nodules of P1 becoming obsolete on succeeding whorls. On last whorl, P4 visible, peripheral, thin, nearly smooth; P1 obsolete, even absent on several specimens. Aperture subcircular; outer lip thin, indented by external spiral cords, without angle with inner lip. Columella curved, slightly prosocline, without tooth or with a weak blunt tooth at mid-height. Base moderately convex, with 3 spiral cords; 2 outermost cords thin, smooth or only weakly subgranular; innermost one stronger than others, granular with sharp nodules, bordering umbilicus; distance between cords four times broader than cords; axial lamellate threads between the two innermost cords. Umbilicus wide, diameter measuring ca. 30% of shell width, funnel shaped, with thin axial lamellae, without spiral cord. *Colour* of teleoconch silver-grey, without maculation; protoconch off-white.

	TW	H	W	HA	H/W	H/HA
holotype	7.8	16.2	13.1	5.4	1.24	3.00
paratype MNHN 1	7.7	16.0	13.0	5.7	1.23	2.81
paratype MNHN 2	7.8	15.4	13.4	5.4	1.15	2.85
paratype MNHN 3	7.4	14.1	11.8	4.8	1.19	2.94
paratype MNHN 4	7.4	13.7	11.8	4.6	1.16	2.98
paratype MNHN 5	7.2	12.6	11.1	4.9	1.14	2.57
paratype MNHN 6	6.9	13.1	11.4	5.0	1.15	2.62
paratype MZB 1	7.0	14.0	11.6	5.2	1.21	2.69
paratype MZB 2	7.8	14.0	11.4	5.5	1.23	2.55
paratype CV	7.6	14.6	13.0	5.3	1.12	2.75

Table 5. - *Calliotropis cynee* : Shells measurements in mm for types.

Discussion. *Calliotropis cynee* n. sp. is rather close to *C. conooides* n. sp. (Figs 6-9) from Solomon Islands, but this species has a more slender shape, a granular P4 emerging much earlier (at the fourth whorl), four spiral cords on the base and no umbilicus. The new species also weakly resembles to the cosmopolite *C. infundibulum* (Watson, 1879) (Figs 84-85), but this species shows a P1 cord strong and granular, still present on last whorl, and has 4 ou 5 spiral cords on the base. *C. cynee* n. sp. is also superficially similar to *C. diomediae* (Verril, 1880) from north-western Atlantic, but this slightly larger species has a strong, granular spiral cord P1, far from the suture on last whorl, and 4 spiral cords on the base. The new species remembers also *C. minorusaitoi* Poppe, Tagaro & Dekker, 2006 from Philippines, but this species is larger for a smaller number of whorls,

has a globose, not conical, shape, a narrower umbilicus and 4 spiral cords on the base. **Etymology.** Leather helmet (Greek : κυνης), used as a noun in apposition - with reference to the look of the shell.

Calliotropis infundibulum (Watson, 1879)
Figs 84-85

Trochus infundibulum Watson, 1879: 707-708. Type locality: Prince Edward Island (Indian-Atlantic Ridge area), 46°46'S, 45°31'E, 2514 m. Other references : *Solariella infundibulum* - Dall, 1889: 380-381. *Solariella infundibulum* - Dall, 1890: 349-352. *Solariella infundibulum* - Abbott, 1974: 41, fig. 287. *Solariella infundibulum* - Cernohorsky, 1977: 105, fig. 1.

Calliotropis infundibulum - Marshall, 1979: 531, figs. 4F-G, 9C-F.

Calliotropis infundibulum - Kaicher, 1990: 5690.

Calliotropis infundibulum - Sasaki, 2000: 59, pl. 29, fig. 25.

Calliotropis infundibulum - Vilvens, 2004: figs. 27-28.

Material examined. **New Caledonia.** BLOCAL: stn CP23, 22°46'S, 166°20'E, 2040 m, 1 dd. - Stn CP27, 23°06'S, 166°26'E, 1850-1900 m, 1 dd. - **Loyalty Basin.** BIOGEOCAL: stn CP250, 21°25'S, 166°28'E, 2350 m, 1 dd. - Stn CP329, 21°09'S, 166°40'E, 2310-2315 m, 1 dd.

Distribution. Western Atlantic (from northern America to Brazil), 230-3259 m (Clarke, 1962), Indian-Atlantic Ridge, 1965-2514 m (Watson, 1879); South Africa, 2750 m (Martens, 1903); Japan, 2000-2150 m (Higo et al., 1999); south-western Pacific, 2040-2315 m; New Zealand, 2080-2515 m (Marshall, 1979).

Remarks. This is an extension of this widespread species, known from western Atlantic to western Indo-Pacific.

Calliotropis hataii Rehder & Ladd, 1973
Figs 86-87

Calliotropis hataii Rehder & Ladd, 1973: 43-44, figs. 16-18. Type locality: central Pacific (Hess Guyot), 17°53.2'N, 174°28.28'W, 1719-1763 m.

Other references:

Calliotropis hataii - Kaicher, 1987: 5064.

Calliotropis hataii - Vilvens, 2006: 60, figs. 16-17.

Material examined. **New Caledonia.** BLOCAL: stn CP17, 20°35'S, 167°25'E, 3680 m, 1 dd. - Stn CP26, 22°40'S, 166°27'E, 1618-1740 m, 3 dd. - Stn CP57, 23°44'S, 166°58'E, 1490-1620 m, 5 dd. - BATHUS 1: stn 661, 21°05'S, 165°50'E, 960-1100 m, 2 dd.

Loyalty Basin. BIOGEOCAL: stn CP214, 22°43'S, 166°28'E, 1590-1665 m, 1 dd.

Fiji. MUSORSTOM 10: stn CP1354, 17°42.6'S, 178°55.0'E, 959-963 m, 5 dd, 1 dd sub. - Stn CP1361, 18°00.0'S, 178°53.7'E, 1058-1091 m, 2 dd.

South-western Pacific. MUSORSTOM 7: stn CP620, 12°34'S, 178°11'W, 1280 m, 2 dd. - Stn CP621,

12°35'S, 178°11'W, 1280-1300 m, 4 dd. - Stn CP622, 12°34'S, 178°11'W, 1280-1300 m, 1 dd. - Stn CP623, 12°34'S, 178°15'W, 1280-1300 m, 4 dd.

Distribution. Central Pacific, 1617-1719 m (Rehder & Ladd, 1973); south-western Pacific, 1058-1280; south-western Indian Ocean, 3716 m (Vilvens, 2006).

Remarks. This species was described from Central Pacific Ocean and recently recorded in south-western Indian Ocean (Vilvens, 2006), but seems to be much more widespread. In some examined specimens, P1 is dividing in two cords, but except this feature, all specimens share the same ontogeny of cords as stated in the original description.

Calliotropis chalkeie n. sp.
Figs 24-31, Table 6

Type material. Holotype (6.5 x 4.9 mm) MNHN (9841). Paratypes: 8 MNHN (9842), 2 NMNZ (M.273550), 1 coll. C.Vilvens.

Type locality. Loyalty Basin, BIOGEOCAL, stn DW313, 20°59'S, 166°59'E, 1600-1640 m.

Material examined. **Loyalty Basin.** BIOGEOCAL: stn KG201, 22°40'S, 166°33'E, 595 m, 1 dd sub. - Stn KG219, 22°39'S, 166°34'E, 570 m, 2 dd, 1 dd juv. - Stn KG222, 22°45'S, 166°25'E, 1675 m, 1 dd. - Stn KG227, 21°33'S, 166°24'E, 500 m, 1 dd, 1 dd sub, 7 dd juv. - Stn KG234, 21°29'S, 166°25'E, 570 m, 1 dd. - Stn CP238, 21°28'S, 166°23'E, 1260-1300 m, 5 dd. - Stn CP260, 21°00'S, 166°58'E, 1820-1980 m, 3 dd, 1 dd sub, 2 dd juv. - Stn DW313, 20°59'S, 166°59'E, 1600-1640 m, 7 dd (holotype and paratypes), 13 dd sub (with 5 paratypes), 5 dd juv.

New Caledonia. BLOCAL: stn KG06, 20°35'S, 166°53'E, 735 m, 8 dd, 6 dd juv. - Stn CP26, 22°40'S, 166°27'E, 1618-1740 m, 1 dd. - Stn DW51, 23°05'S, 167°45'E, 680-700 m, 3 dd. - Stn CP57, 23°44'S, 166°58'E, 1490-1620 m, 4 dd juv. - Stn CP62, 24°19'S, 167°49'E, 1395-1410 m, 1 dd. - Stn DW79, 20°40'S, 166°52'E, 1320-1380 m, 4 dd. - CALSUB: PL13, 21°26'S, 166°23'E, 1600 m, 2 dd juv. - BATHUS 1: stn DW696, 20°34'S, 164°57'E, 497-520 m, 2 dd, 3 dd juv. - BATHUS 3: stn DW790, 23°49'S, 169°48'E, 685-715 m, 3 dd, 1 dd sub.

Figures 10-19. Scale bar = 5 mm.

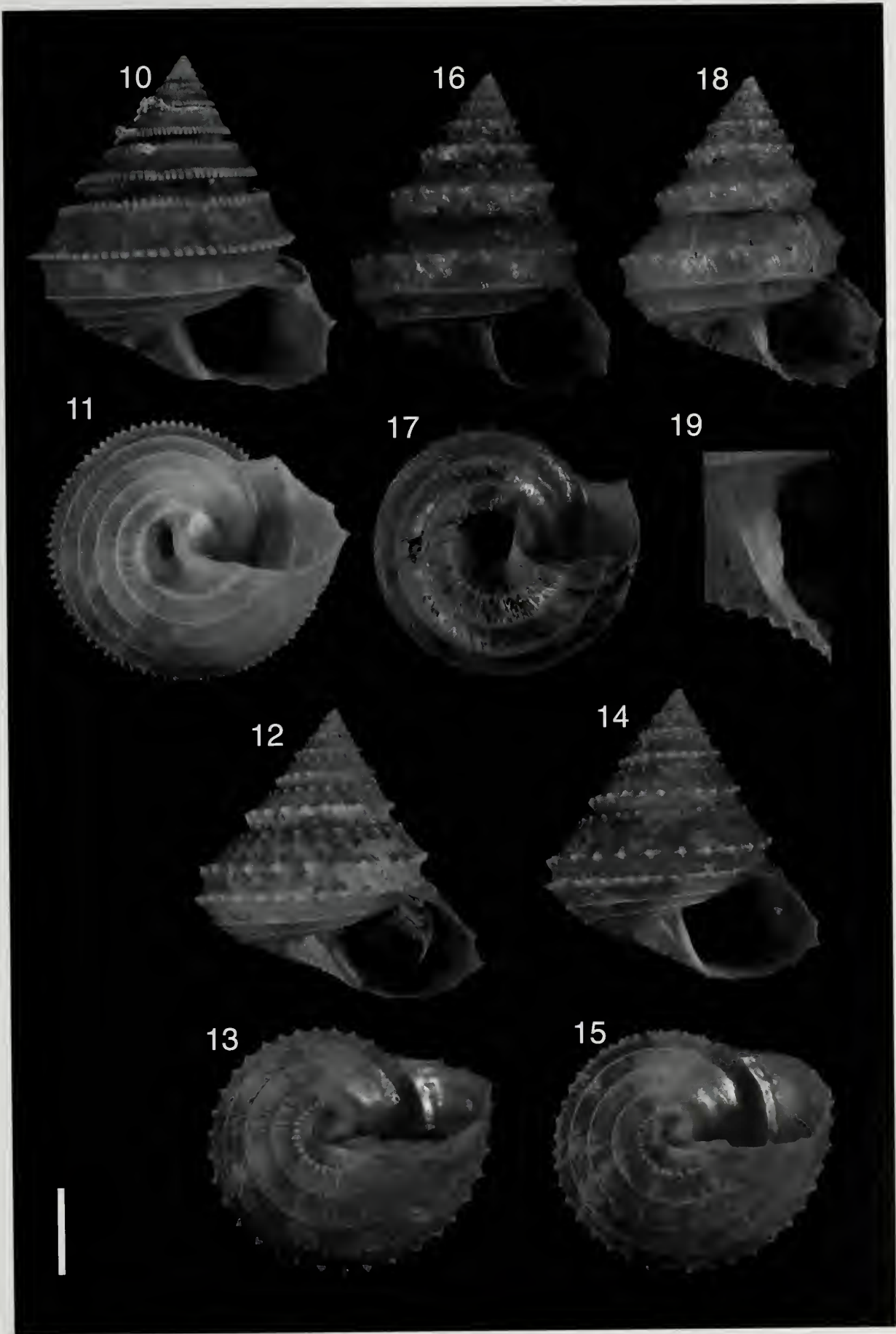
10-11. *Calliotropis excelsior* Vilvens, 2004, holotype MNHN, Fiji, 959-963 m [MUSORSTOM 10, stn. CP1354], 24.4 x 20.9 mm.

12-15. *C. helix* n. sp., Taiwan, South China Sea, 790 m [TAIWAN 2000, stn CP30].

12-13. Holotype NTOU, 19.6 x 19.4 mm; **14-15.** Paratype MNHN (9838), 19.8 x 18.1 mm.

16-19. *C. cyneae* n. sp., Indonesia, Tanimbar Islands, 1084-1058 m [KARUBAR, stn CP89].

16-17. Holotype MNHN (9839), 16.2 x 13.1 mm; **18.** Paratype MNHN (9840), columella with basal tooth, 15.5 x 13.3 mm; **19.** Columella with basal tooth of paratype MNHN (9840).



Solomon Islands. SALOMON 1: stn CP1751, 9°10.4'S, 159°53'E, 749-799 m, 1 dd. - Stn CP1754, 9°00.1'S, 159°49.0'E, 1169-1203 m, 1 dd. - Stn DW1781, 8°31.2'S, 160°37.7'E, 1036-1138 m, 1 dd, 1 dd juv. - Stn CP1806, 9°37.0'S, 160°49.7'E, 621-708 m, 2 dd, 1 dd juv. - Stn CP1808, 9°45.5'S, 160°52.5'E, 611-636 m, 8 dd, 5 dd sub.

South-western Pacific, Wallis and Futuna Islands. MUSORSTOM 7: stn DW507, 14°20'S, 178°07'W, 419-425 m, 1 dd. - Stn DW519, 14°13'S, 178°09'W, 500 m, 1 dd. - Stn DE568, 11°46'S, 178°27'W, 1011 m, 1 dd. - Stn DW601, 13°19'S, 176°17'W, 350 m, 3 dd sub. - Stn DW604, 13°21'S, 176°08'W, 415-420 m, 1 dd, 1 dd sub. - Stn DW608, 13°22'S, 176°08'W, 440-458 m, 7 dd, 2 dd juv.

Vanuatu. MUSORSTOM 8: stn CP1110, 14°49'S, 167°15'E, 1360 m, 4 dd, 1 dd juv.

Fiji. BORDAU 1: stn DW1485, 19°03'S, 178°30'W, 700-707 m, 6 dd, 2 dd sub, 2 dd juv.

Distribution. South-western Pacific (from Solomon Islands to New Caledonia and Fiji), 707-1360 m.

Diagnosis. A *Calliotropis* species with high spire, conical shape, silvery, with 3 spiny primary spiral cords on spire whorls and up to 7 spiral spiny cords on last whorl; base with about 7 spiral spiny cords; umbilicus with 2 spiny spiral cords inside.

Description. *Shell* of small size for the genus (height up to 6.5 mm, width up to 4.9 mm), higher than wide, thin, conical; spire high, height 1.1x to 1.3x width, 2.7x to 4.3x aperture height; umbilicus deep and rather large.

Protoconch from 250 to 300 µm, of 1 whorl, smooth, bulbous, with a rather thick, slightly curved terminal varix.

Teleoconch up to 6.2 convex whorls, bearing up to 7 spiral granular cords and prosocline ribs;

nodules from cords produced by intersections with axial ribs.

Suture visible, impressed but not canaliculated.

First whorl convex, sculptured by about 15 weakly prosocline smooth thick ribs, interspace between ribs 2x broader than ribs. Primary spiral cords P1 appearing at end of first whorl or at beginning of second whorl; P2 appearing a quarter of whorl later; both cords formed by weak rounded nodules. On third whorl, P2 stronger than P1, with nodules becoming sharp and clearly separated; P3 appearing at mid whorl, quickly as strong as P2. On fourth whorl, P2 and P3 strongly spiny; P1 slightly weaker than the other cords; spines of P1 and P2 oriented at an angle of about 45°, those of P3 horizontally oriented. On fifth whorl, spines of cords becoming scaly; P1 dividing into two cords, the most adapical weaker; axial ribs still strong, becoming more prosocline; S1 and S2 appearing at end of whorl or on the sixth whorl. On last whorls, P4 emerging from suture, weaker than P3, spiny; S3 appearing near begin of sixth whorl, becoming spiny on some big specimens. Aperture circular; outer lip thin, without angle with inner lip.

Columella curved, vertical, without tooth.

Base moderately convex, with 4 main spiny spiral cords and a weaker cord between them; outermost the thickest, innermost the thinnest with sharp thin spines, bordering umbilicus; distance between cords similar in size to cords; axial ribs clearly visible, connecting nodules of spiral cords.

Umbilicus rather wide, diameter measuring ca. 25% of shell width, deep, funnel shaped, with thin ribs and 2 spiny spiral cords, sometimes with an additional thin spiral cord near border.

Colour of teleoconch light pinkish brown; protoconch off-white.

	TW	H	W	HA	H/W	H/HA
holotype	6.2	6.5	4.9	1.6	1.33	4.06
paratype MNHN 1	6.0	5.4	4.4	1.2	1.23	4.50
paratype MNHN 3	5.5	5.0	3.9	1.6	1.28	3.13
paratype MNHN 4	5.9	6.0	4.7	2.1	1.28	2.86
paratype MNHN 5	5.5	4.7	3.7	1.3	1.27	3.62
paratype NMNZ 1	6.0	5.5	4.1	1.3	1.34	4.23
paratype CV	5.3	4.6	4.1	1.7	1.12	2.71

Table 6. - *Calliotropis chalkeie*: Shells measurements in mm for largest types.

Discussion. This species is rather variable regarding the shape of the spines of the spiral cords.

Calliotropis chalkeie n. sp. is very close to *C. spinosa* Poppe, Tagaro & Dekker, 2006 from Philippines, but this species is slightly less elevated, is smaller for a

similar number of whorls and its last whorl is higher than half of the shell height (instead of measuring about 2/5 of this height).

C. chalkeie n. sp. is rather close to *C. lamellifera* Jansen, 1994 (Figs 20-23) from eastern Australia, but

this species has a more acute shape, thicker, not scaly, less numerous spines on the spiral cords on the whorls, thinner, nearly smooth outermost spiral cords on base without strong axial ribs between them, and nodular, not spiny, spiral cords in the umbilicus.

The new species also superficially similar to *C. hondoensis* (Dall, 1919) from Japan, but this much taller species has granular, not spiny, thinner cords on whorl, and nearly smooth outermost spiral cords on base without strong axial ribs between them; its umbilicus is wider than the one of the new species.

C. chalkeie n. sp. also weakly resembles to *C. solariellaformis* Vilvens, 2006 (Figs 32-33) from Réunion Island, but this species is different in having a slightly less elevated spire, S1 appearing much earlier, less numerous and not spiny granules on spiral cords and a proportionally larger aperture.

The new species may also be compared to *C. ericius* Vilvens, 2006 (Figs 34-35) from Mayotte and Réunion Islands, but this species has more convex whorls, a less elevated spire, no S2, less numerous and only prickly, not scaly, spiny granules on spiral cords.

Remarks. All the specimens of Solomon Islands have a S1 cord always appearing first, at end of fourth whorl and S2 appearing second at end of fifth whorl. However, this inversion of order of apparition of S1 and S2 compared to the most specimens of New Caledonia may also be found in some specimens of Wallis Is., Futuna Is., Loyalty Basin and Fiji. So this feature can't be used to distinguish a geographical subspecies.

Etymology. Thistle (Greek : *χαλκεῖη*), used as a noun in apposition - with reference to the spiny nodules of the spiral cords.

Calliotropis acherontis Marshall, 1979
Figs 36-41

Calliotropis acherontis Marshall, 1979: 529-530, figs. 3L-O 9A-B, tab 5. Type locality: Kermadec Islands (Raoul Is.), 29°16.5'S, 177°49.5'W, 512-549 m.

Other references :

Calliotropis acherontis - Jansen, 1994: 48-49, pl. 1, figs. e-f.

Calliotropis acherontis - Vilvens, 2006: 66, figs. 44-46.

Material examined. New Caledonia. LAGON: stn 40, 250-350 m, 22°10'S 166°24'E, 1 dd. - Stn 22, 22°59'S, 167°17'E, 540-545 m, 1 dd. - BIOCAL: stn DW08, 20°34'S, 166°54'E, 435 m, 3 dd. - Stn DW46, 22°53'S, 167°17'E, 570-610 m, 100 dd. - Stn DW48, 23°00'S, 167°29'E, 775 m, 1 dd. - Stn DW66, 24°55'S, 168°22'E, 505-515 m, 1 dd. - MUSORSTOM 4: stn DW221, 22°59'S, 167°37'E, 535-560 m, 15 lv. - CALSUB: PL15, 20°37'S, 166°56'E, 538 m, 1 dd sub & 2 dd juv. - SM1B 8: DW193-196, 22°52'S-23°S,

167°20'-168°22'E, 491-558 m, 1 dd. - BATHUS 1: stn CP651, 21°42'S, 166°40'E, 1080-1180 m, 12 dd, 6 dd juv. - BATHUS 2: stn DW719, 22°48'S, 167°16'E, 444-445 m, 1 dd. - Stn DW720, 22°52'S 167°16'E, 530-541 m, 30 dd. - Stn CP761, 22°19'S, 166°11'E, 490-500 m, 1 dd & 5 dd juv. - BATHUS 3: stn DW824, 23°19'S, 168°00'E, 601-608 m, 2 dd & 2 dd juv. - Stn DW838, 23°01'S, 166°56'E, 400-402 m, 1 dd juv. - HALIPRO 1: stn C858, 21°42'S, 166°41'E, 1000-1120 m, 4 dd. - BATHUS 4: stn DW914, 18°49'S, 163°15'E, 600-616 m, 40 dd. - Stn DW918, 18°49'S, 163°16'E, 613-647 m, 1 dd. - HALIPRO 2: stn BT102, 24°31'S, 161°52'E, 1060-1130 m, 4 dd & 1 dd juv.

Loyalty Basin. BIOGEOCAL: stn KG219, 22°39'S, 166°34'E, 570 m, 20 dd. - Stn KG228, 21°31'S, 166°24'E, 960 m, 1 dd, 6 dd juv. - Stn CP232, 21°34'S, 166°27'E, 760-790 m, 25 dd juv. - Stn KG261, 21°02'S, 167°02'E, 1508 m, 1 dd, 1 dd juv. - Stn DW292, 20°28'S, 166°48'E, 465-470 m, 1 dd.

Wallis and Futuna Islands. MUSORSTOM 7: stn DW507, 14°20'S, 178°07'W, 419-425 m, 1 dd. - Stn DW523, 13°12'S, 176°16'W, 455-515 m, 4 dd, 1 dd juv. - Stn DW560, 11°47'S, 178°20'W, 697-702 m, 1 dd. - Stn DW585, 13°10'S, 176°13'W, 415-475 m, 1 dd. - Stn DW601, 13°19'S, 176°17'W, 350 m, 100 dd. - Stn DW604, 13°21'S, 176°08'W, 415-420 m, 40 dd. - Stn DW608, 440-458 m, 13°22'S 176°08'W, 40 dd.

Fiji. MUSORSTOM 10: stn DW1353, 17°30.9'S, 178°53.3'E, 879-897 m, 2 dd. - Stn CP1360, 17°59.6'S, 178°48.2'E, 402-444 m, 4 dd.

Vanuatu. MUSORSTOM 8: stn DW987, 19°23'S, 169°35'E, 1040-1050 m, 4 dd.

Solomon Islands. SALOMON 1: stn DW1785, 9°20.8'S, 160°27.3'E, 400 m, 1 dd. - Stn CP1806, 9°37.0'S, 160°49.7'E, 621-708 m, 6 dd. - Stn CP1808, 9°45.5'S, 160°52.5'E, 611-636 m, 20 dd. - Stn CP1837, 10°12.8'S, 161°28.6'E, 381-383 m, 3 dd. - Stn CP1858, 9°37.0'S, 160°41.7'E, 435-461 m, 1 dd, 3 dd juv.

Distribution. South-western Pacific (from eastern Australia to Solomon Islands, New Caledonia and Fiji), alive in 535-560, shells in 621-1040 m; south-western Indian Ocean, 500-770 m (Vilvens, 2006).

Remarks. This species was originally described from Kermadec Islands, but appears now to have a very wider distribution area.

Calliotropis crystallophora Marshall, 1979
Figs 42-45

Calliotropis crystallophorus Marshall, 1979: 530, figs. 4A-D, tab. 6. Type locality: Kermadec Islands (Raoul Is.), 29°16.5'S, 177°14.5'W, 512-549 m.

Other reference :

Calliotropis crystallophora - Vilvens, 2006: 68, figs. 47-48.

Material examined. New Caledonia. BIOCAL: stn KG06, 20°35'S, 166°53'E, 735 m, 3 dd. - Stn DW56, 23°35'S, 167°12'E, 1490-1620 m, 1 dd. - BATHUS 3: stn DW790, 23°49'S, 169°48'E, 685-715 m, 2 dd sub, 1 dd juv. - Stn DW 809, 23°39'S, 167°59'E, 650-730 m, 1 dd.

Loyalty ridge. MUSORSTOM 6: stn DW468, 21°06'S, 167°33'E, 600 m, 5 dd, 2 dd juv.

South-western Pacific, Wallis and Futuna Islands. MUSORSTOM 7: stn DW594, 12°31'S, 174°20'W, 495-505 m, 1 dd. - Stn DW604, 13°21'S, 176°08'W, 415-420 m, 1 dd.

Fiji. BORDAU 1: stn DW1485, 19°03'S, 178°30'W, 700-707 m, 2 dd.

Vanuatu. MUSORSTOM 8: stn CP1036, 18°01'S, 168°48'E, 920-950 m, 1 dd.

Tonga. BORDAU 2: stn DW1588, 18°40'S, 173°52'W, 630-710 m, 1 dd juv.

Distribution. South-western Pacific (from New Caledonia to Tonga), 495-920 m.

Remarks. The main distinguishing features of *C. crystalophora* Marshall, 1979 are a small size (height about 4.5 mm), a relatively high spire, up to 7.5 whorls, 2 sharp spiral cords on whorls (P1 near the suture, separated from it by a nearly horizontal subsutural ramp, and P3 stronger, median), P4 peripheral on last whorl, widely spaced axial ribs on the whole surface, microsculpture of irregular crystals, 4 granular spiral cords on the base, a shallow, rather narrow umbilicus.

There is no mention in the original description of spiral cords within the umbilicus, but close examination of the NMNZ holotype showed presence of at least one thin spiral cord. I don't know any other reference to this species and there is no indication about the variability of the shell. Specimens of MUSORSTOM 6: stn DW468, BATHUS 3: stn DW 809 and BIOCAL: stn DW56 match the characteristics

of *C. crystalophora*, except that a secondary spiral cord S2 is present on last whorl and the umbilicus has a granular spiral cord within. Moreover, specimens of BIOCAL: stn DW56 have tertiary cords between P1 and P2. There is no obvious relation with depth.

***Calliotropis ptykte* n. sp.**

Figs 46-49, Table 7

Type material. Holotype (4.1 x 3.2 mm) MNHN (9843). Paratypes: 5 MNHN (9844), 1 coll. C.Vilvens.

Type locality. Tonga, south of Nomuka group, BORDAU 2, stn DW1549, 20°38'S, 175°00'W, 500 m.

Material examined. Tonga. BORDAU 2: stn DW1549, 20°38'S, 175°00'W, 500 m, 7 dd (holotype and paratypes). - Stn DW1615, 23°03'S, 175°53'W, 482-504 m, 1 dd juv.

Distribution. Tonga, 500 m.

Diagnosis. A small *Calliotropis* species with high spire, conical shape, white, with thin crowded axial ribs on the whole surface, 2 granular spiral cords on spire whorls, a keel at the abapical cord; 5 spiral cords on last whorl; base with 4 granular spiral cords; umbilicus with a thin spiral cord inside.

Description. *Shell* of small size for the genus (height up to 4.1 mm, width up to 3.2 mm), higher than wide, thin, conical; spire high, height 1.2x to 1.4x width, 3.9x to 4.9x aperture height; umbilicus rather narrow. *Protoconch* from 180 to 200 µm, of 1 whorl, glassy, with a very weak, slightly curved terminal varix. *Teleoconch* up to 6 weakly convex whorls, bearing up to 7 spiral granular cords and prosocline ribs; nodules from cords produced by intersections with axial ribs. Suture weakly canaliculated.

Figures 20-35. Scale bar = 5 mm.

20-23. *Calliotropis lamellifera* Jansen, 1994.

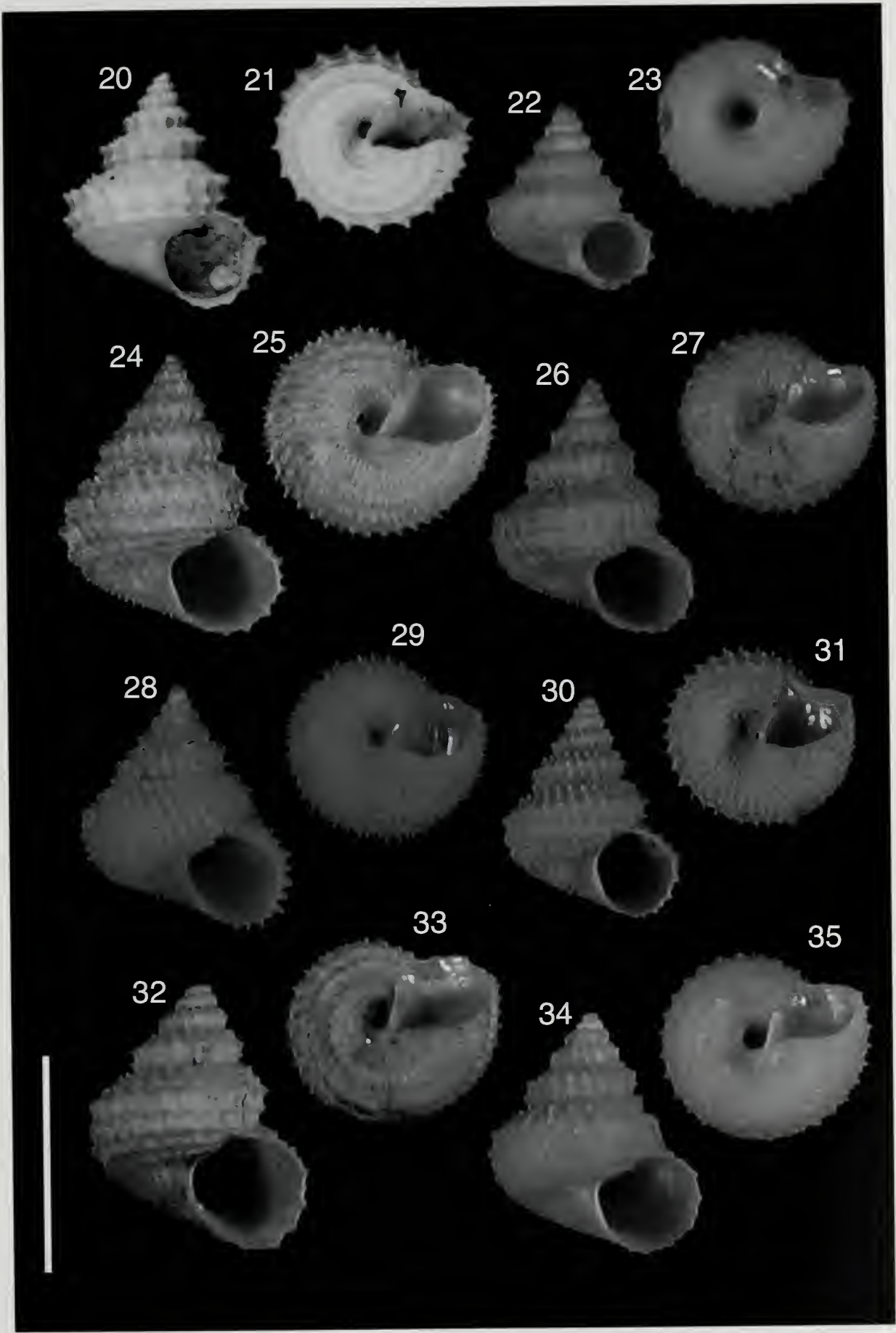
20-21. Holotype AMS (C. 169587), New South Wales, off Sidney, 1106-1143 m, 4.8 x 4.3 mm - Photographs taken by M.Allen, AMS; **22-23.** MNHN, New Caledonia, 908 m [BIOCAL, stn CP844], 3.3 x 2.8 mm.

24-31. *C. chalkeie* n. sp.

24-27. Loyalty Basin, 1600-1640 m [BIOGEOCAL, stn DW313]. **24-25.** Holotype MNHN (9841), 6.5 x 4.9 mm; **26-27.** Paratype MNHN (9842), 5.4 x 4.4 mm; **28-29.** MNHN, New Caledonia, 680-700 m [BIOCAL, stn DW51], 4.8 x 4.4 mm; **30-31.** MNHN, Solomon Islands, 611-636 m [SALOMON 1: stn CP1808], 4.4 x 3.7 mm.

32-33. *C. solariellaformis* Vilvens, 2006, holotype MNHN (5816), Réunion Island, 1150-1180 m [MD32/REUNION, stn DC64], 6.0 x 4.9 mm.

34-35. *C. ericius* Vilvens, 2006, holotype MNHN (5808), Mayotte, 1300-1480 m [BENTHEDI, stn 40], 4.7 x 4.1 mm.



First whorl convex, sculptured by about 15 prosocline smooth ribs, interspace between ribs 1.5x broader than ribs. Primary spiral cords P1 appearing at end of first whorl, P3 at beginning of second whorl, both granular; P2 absent. On second whorl, P3 slightly stronger than P1; P1 producing a weak shoulder and P3 a weak keel. On third whorl, beads of P1 slightly sharp, blunt, adapically oriented; axial ribs thicker, more prosocline, distance between them as broad as ribs. S1 appearing on fifth whorl, weak; S3 appearing at end of fifth whorl or at begin of sixth whorl, weaker than P3 but quickly stronger than S1; tertiary cords T1 and T3 may appear between P1 and S1, and S1 and P3; axial ribs more prosocline in area above P3 than under this

cord. On last whorl, P4 emerging from suture, almost as strong as P3. Aperture circular, indented by external spiral cords; outer lip thin, without angle with inner lip. Columella more or less straight, slightly oblique, without tooth. Base moderately convex, with 4 thick granular spiral cords; distance between cords similar in size to cords; strong axial ribs between cords, connecting beads of spiral cords. Umbilicus rather narrow, diameter measuring ca. 10% of shell width, rather deep, funnel shaped, with thin ribs and 1 weak spiral cord inside, near border. Colour of teleoconch ivory white; protoconch translucent white.

	TW	H	W	HA	H/W	H/HA
holotype	6.0	4.1	3.2	0.9	1.28	4.56
paratype MNHN 1	6.0	3.6	2.8	0.9	1.29	4.00
paratype MNHN 2	5.6	3.9	3.2	1.0	1.22	3.90
paratype MNHN 3	5.6	3.9	3.0	0.8	1.30	4.88
paratype MNHN 4	5.0	3.9	2.9	0.9	1.34	4.33
paratype MNHN 5	5.8	4.0	2.9	0.9	1.38	4.44
paratype CV	6.0	3.9	2.9	0.9	1.34	4.33

Table 7. - *Calliotropis ptykte* : Shells measurements in mm for types.

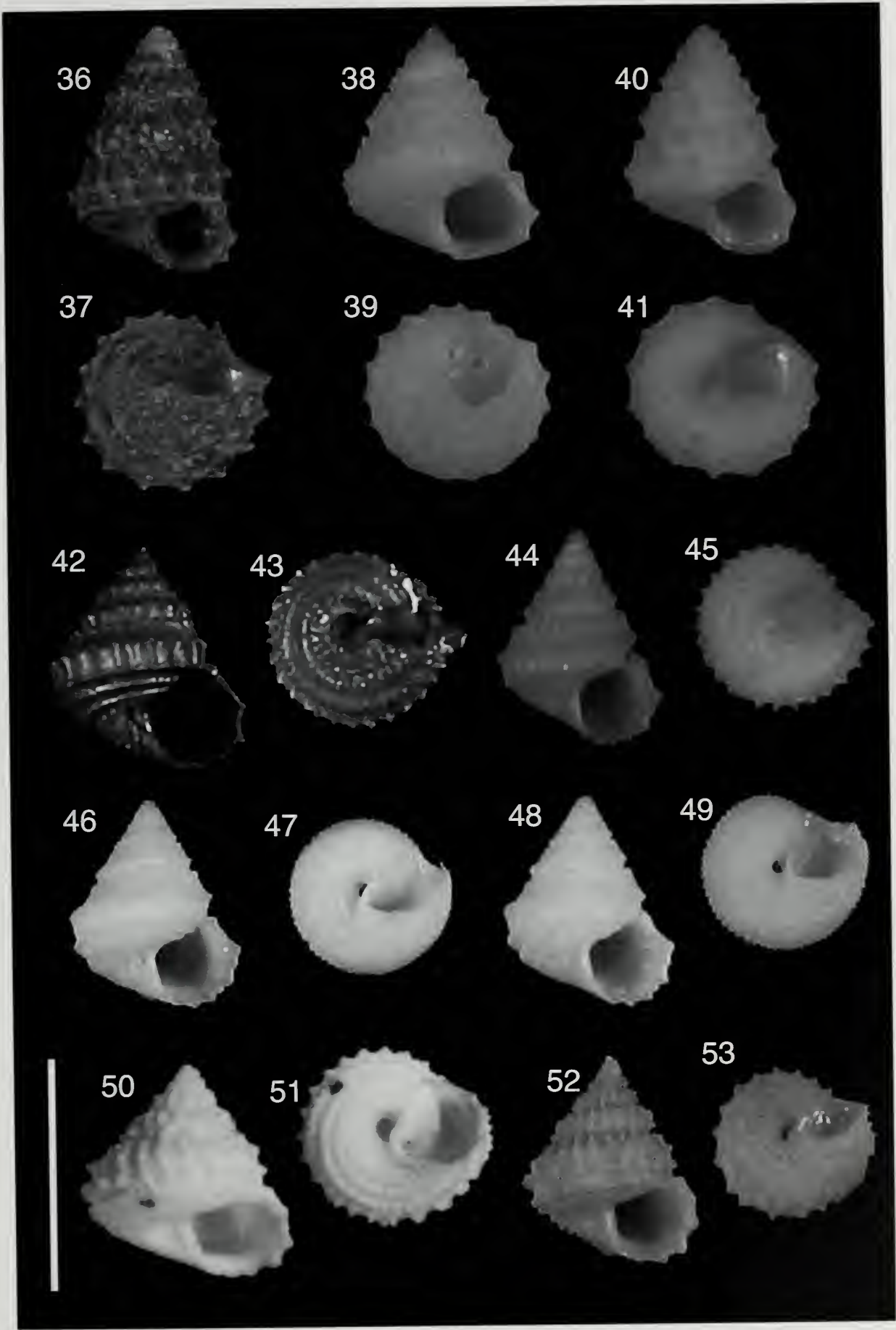
Discussion. *Calliotropis ptykte* n. sp. is close to *C. crystalophora* Marshall, 1979 from New Caledonia area, but this species has a larger H/W ratio, beads of spiral cords thicker and more spaced, axial ribs more spaced out, no S1, outermost basal spiral cords nearly smooth. Regarding the number of primary spiral and basal cords, the new species may also be compared to *C. chuni* (von Martens, 1904) from eastern Africa, but this species has thicker, sharp and more spaced beads on spiral cords, lacks S1 and S3, has outermost smooth basal spiral cords and no spiral cord within the umbilicus.

Etymology. Pleated (Greek : πτυχτος) - with reference to the crowded axial ribs on the surface of the shell.

Calliotropis lamellifera Jansen, 1994
Figs 20-23
Calliotropis lamellifera Jansen, 1994: 51-52, pl. 2, figs c, d. Type locality: Eastern Australia (off New South Wales), 33°35-37'S, 152°05'E, 1106-1143 m. Other reference : *Calliotropis lamellifera* - Vilvens, 2006: 62, figs. 22-23.
Material examined. **New Caledonia.** BIOCAL: stn CP23, 22°46'S, 166°20'E, 2040 m, 1dd. - BATHUS 1: stn CP671, 20°51'S 165°28'E, 450-470 m, 1 dd, 2 dd juv. - BATHUS 3: stn CP844, 23°06'S, 166°46'E, 908 m, 1 dd.
Loyalty Basin. BIOGEOCAL: stn KG287, 20°43'S, 166°53'E, 1560 m, 1 dd juv.

Figures 36-53. Scale bar = 5 mm.

- 36-41. *Calliotropis acherontis* Marshall, 1979
36-37. MNHN, New Caledonia, 1060-1130 m [HALIPRO 2, stn BT102], 5.2 x 3.4 mm; 38-39. MNHN, New Caledonia, 775 m [BIOCAL, stn DW48], 4.6 x 3.3 mm; 40-41. MNHN, Wallis and Futuna Islands, 440-458 m [MUSORSTOM 7, DW608], 3.6 x 2.5 mm.
42-45. *C. crystalophora* Marshall, 1979.
42-43. Holotype NMNZ (M230817), Raoul Island, 512-549 m, 4.0 x 3.5 mm; 44-45. MNHN, New Caledonia, 735 m [BIOCAL, stn KG06], 4.6 x 2.5 mm.
46-49. *C. ptykte* n. sp.
46-47. Holotype MNHN (9843), 4.6 x 4.5 mm; 48-49. Paratype MNHN (9844), 4.5 x 4.4 mm.
50-53. *C. multisquamosa* (Schepman, 1908).
50-51. Holotype ZMA (3.08.060), Indonesia, 4.7 x 4.8 mm; 52-53. MNHN, New Caledonia, 270-282 m [BATHUS 1, stn DW688], 4.3 x 3.5 mm.



Distribution. Eastern Australia, 322-1330 m (Jansen, 1994) and New Caledonia area, 470-2040 m.

Remarks. This species was originally described from New South Wales and Queensland, and its distribution is now widened to New Caledonia area.

Calliotropis multisquamosa (Schepman, 1908)
Figs 50-53

Solariellopsis multisquamosa Schepman, 1908: 57, pl IV, fig. 7a-c. Type locality: Indonesia (Sula), 5°43.5'S, 119°44'E, 522 m.

Material examined. New Caledonia. SMIB 8: stn DW152-154, 23°18'S-23°19'S, 168°05'E, 305-367 m, 1 dd sub. - Stn DW170-172, 23°41'S, 168°00'E-168°01'E, 230-290 m, 1 dd. - Stn DW190, 23°18'S, 168°05'E, 305-310 m, 7 dd sub, 3 dd juv. - BATHUS 1: stn DW688, 20°33'S, 165°00'E, 270-282 m, 1 dd, 1 dd juv.

Distribution. Indonesia, 522 m (Schepman, 1908); New Caledonia, 282-305 m.

Remarks. The examination of the holotype shows that the main distinguishing features of *Calliotropis multisquamosa* (Schepman, 1908) are a small size (height about 5.5 mm), a moderately elevated spire, teleoconch up to 5 whorls, 3 sharp spiral cords on whorls (P2 and P3 the strongest, P1 appearing later, weaker), an additional P4 peripheral on last whorl, 3 granular spiral cords on the base and a shallow, wide umbilicus with 1 spiral cord inside.

The New Caledonian specimens map these features, except a slightly more elevated spire and the fact that P1 is lacking in subadult and juvenile specimens. So, despite the huge gap between New Caledonia and the type locality, there is no reason to not use this available name.

Calliotropis solomonensis n. sp.
Figs 54-57, Table 8

Type material. Holotype (4.4 x 3.7 mm) MNHN (9845). Paratypes: 6 MNHN (9846), 2 RMBR (ZRC.MOL.2768-2769), 1 coll. C.Vilvens.

Type locality. Solomon Islands, SALOMON 1: stn DW1855, 9°46.4'S, 160°52.9'E, 253-263 m.

Material examined. Solomon Islands. SALOMON 1: stn DW1817, 9°48.2'S, 160°54.3'E, 233-269 m, 1 dd. - Stn DW1820, 9°52.3'S, 160°51.4'E, 256-329 m, 1 dd. - Stn DW1825, 9°50.5'S, 160°58.0'E, 340-391 m, 1 dd. - Stn DW1855, 9°46.4'S, 160°52.9'E, 253-263 m, 10 dd (holotype and paratypes). - Stn DW1856, 9°46.4'S, 160°52.3'E, 254-281 m, 1 dd. - Stn DW1762, 8°39.9'S, 160°03.9'E, 396-411 m, 2 dd.

Distribution. Solomon Islands, 263-396 m.

Diagnosis. A small off-white *Calliotropis* species with a moderately high spire, cyrtococonoidal shape, evenly spaced axial ribs on the whole surface, 4 granular spiral cords on last whorl, a shoulder at second cord; beads the two median cords sharp; base with 3 granular spiral cords; umbilicus with a spiral cord inside.

Description. *Shell* of small size for the genus (height up to 4.5 mm, width up to 4.1 mm), higher than wide, rather thick, cyrtococonoidal; spire high, height 1.0x to 1.2x width, 3.7x to 4.x aperture height; umbilicus moderately wide.

Protoconch about 250 µm, of 1 whorl, glassy, with a very weak terminal varix.

Teleoconch up to 5.7 convex whorls, bearing 3 spiral granular cords and prosocline ribs; nodules from cords produced by intersections with axial ribs.

Suture visible, impressed, not canaliculated.

First whorl convex, sculptured by about 12 prosocline smooth ribs, interspace between ribs 2.5x broader than ribs; P2 appearing almost immediately, P3 half a whorl later, both granular. On second whorl, P3 slightly stronger than P2; beads of P3 becoming weakly sharp; interspace between ribs 2x broader than ribs. On third whorl, beads of both P2 and P3 sharp; axial ribs thicker, more prosocline, distance between them as broad as ribs. On fourth whorl, P1 appearing, weaker than P2 and P3; shoulder appearing at P2; beads of P3 becoming scaly.

Figures 54-71. Scale bar = 5 mm.

54-57. *Calliotropis solomonensis* n. sp., Solomon Islands, 253-263 m [SALOMON 1, stn DW1855].

54-55. Holotype MNHN (9845), 4.4 x 3.7 mm; **56-57.** Paratype MNHN (9846), 4.5 x 3.9 mm.

58-61. *C. delli* Marshall, 1979.

58-59. MNHN, New Caledonia, 525-547 m [BATHUS 2, stn DW721], 4.7 x 4.6 mm; **60-61.** MNHN, New Caledonia, 610-660 m [BATHUS 4, stn DW919], 5.6 x 5.6 mm.

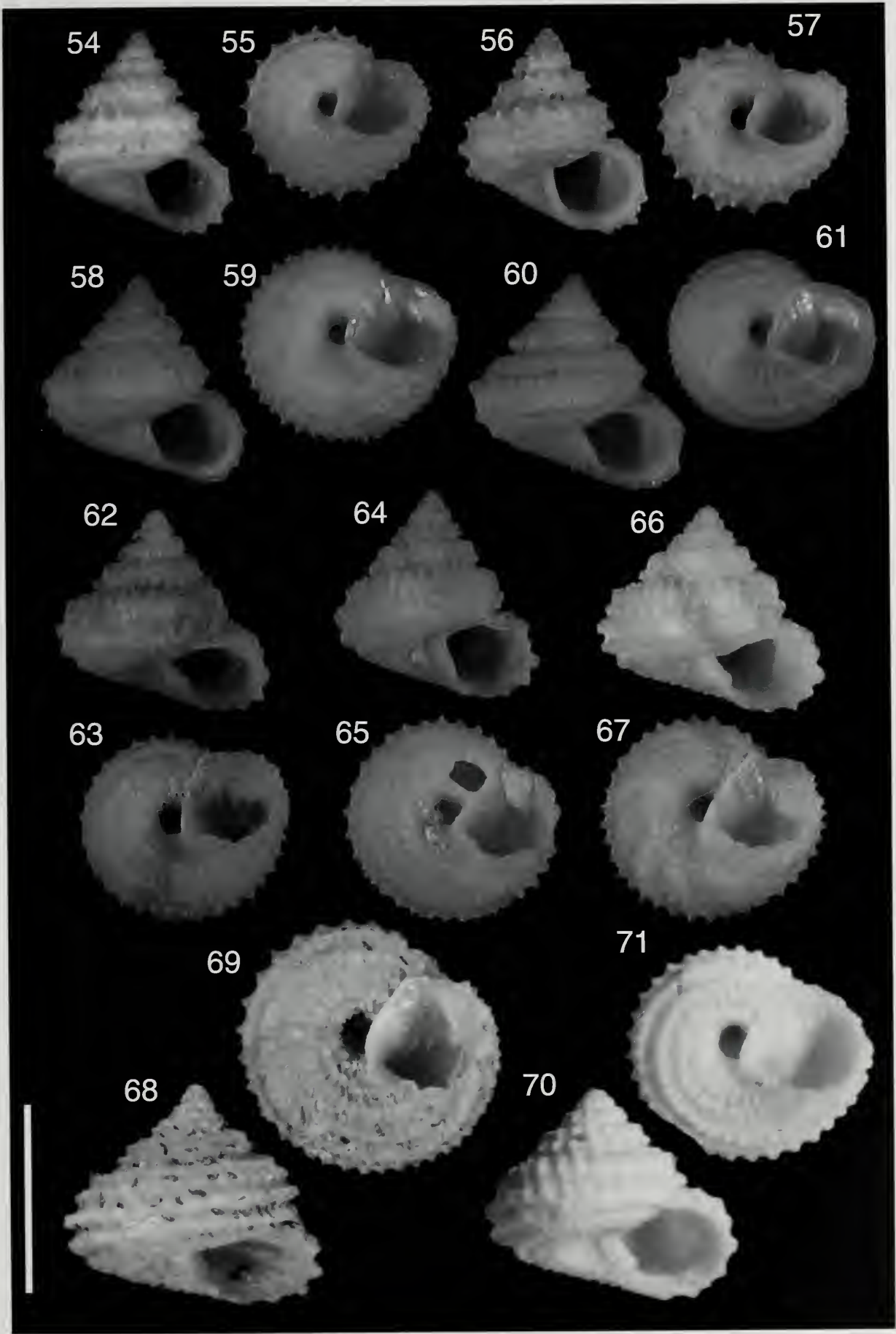
62-67. *C. echidnoides* n. sp.

62-63. Holotype MNHN (9847), 4.6 x 4.5 mm; **64-65.** Paratype MNHN (9848), 4.5 x 4.4 mm; **66-67.**

MNHN, Tonga, 263-320 m [BORDAU 2, stn DW1602], 4.6 x 5.1 mm.

68-69. *C. echidna* Jansen, 1994, holotype AMS (C. 169582), Queensland, 115-124 m, 5.9 x 6.0 mm - Photographs taken by M.Allen, AMS.

70-71. *C. muricata* (Schepman, 1908), holotype ZMA (3.08.061), Indonesia, 5.4 x 4.3 mm.



On fifth whorl, beads of P2 also scaly; beads of P3 slightly stronger and more spiny than those of P2. On last whorl, P4 emerging from suture, granular, weaker than P2 and P3, with beads twice more numerous than those of P2 and P3; axial ribs still visible, thick, weakly prosocline.
Aperture subcircular; outer lip thickened, meeting inner lip with a weak obtuse angle.
Columella almost straight, oblique, without tooth.

Base weakly convex, almost flat, with 3 thick granular spiral cords; distance between cords similar in size to cords; axial ribs between cords, connecting beads of spiral cords.
Umbilicus rather wide, diameter ca. 20% of shell width, deep, funnel shaped with sloped walls, with thin, spaced ribs and 1 granular spiral cord inside.
Colour of teleoconch off-white; protoconch translucent white.

	TW	H	W	HA	H/W	H/HA
holotype	5.6	4.4	3.7	1.0	1.19	4.40
paratype MNHN 1	5.6	4.5	3.9	1.0	1.15	4.50
paratype MNHN 2	5.7	4.4	4.1	1.1	1.07	4.00
paratype MNHN 3	5.5	4.1	3.6	1.1	1.14	3.73
paratype MNHN 4	5.4	3.9	3.4	1.0	1.15	3.90
paratype MNHN 5	5.0	3.8	3.4	0.9	1.12	4.22
paratype MNHN 6	5.4	3.3	3.1	0.8	1.06	4.13
paratype RMBR 1	5.6	4.2	3.9	1.1	1.08	3.82
paratype RMBR 2	5.5	3.2	3.3	0.8	0.97	4.00
paratype CV	5.4	3.6	3.6	0.8	1.00	4.50

Table 8. - *Calliotropis solomonensis* : Shells measurements in mm for types.

Discussion. *Calliotropis solomonensis* n. sp. differs from *C. multisquamosa* (Schepman, 1908) (Figs 50-53) by the conspicuous shoulder at P2 and the more vertical walls of the umbilicus. Both are close to *C. muricata* (Schepman, 1908) (Figs 70-71) from Indonesia, but this species has a more depressed spire, two columellar denticles and two (instead of only one) spiral cords within the umbilicus.

Etymology. After type locality and known distribution restricted to Solomon Islands area.

Calliotropis echidnoides n. sp.
Figs 62-67, Table 9

Type material. Holotype (4.6 x 4.5 mm) MNHN (9847). Paratypes: 4 MNHN (9848), 1 NMNZ (M.273551).

Type locality. Fiji, BORDAU 1, stn DW1464, 18°09'S, 178°38'W, 285-300 m.

Material examined. New Caledonia. LAGON: stn 9, 22°20'S, 167°10'E, 175-200 m, 1 dd. - SMIB 5: stn DW82, 22°32'S, 167°32'E, 155 m, 1 dd. - BATHUS 1: stn CP712, 21°44'S, 166°35'E, 210 m, 1 dd. - BATHUS 2: stn DW715, 22°39'S, 167°11'E, 202-227 m, 2 dd. - Stn DW724, 22°48'S, 167°26'E, 344-358 m, 2 dd, 1 dd juv. - BATHUS 2/MUSORSTOM 8, 9 dd.

Fiji. MUSORSTOM 10: stn DW1370, 18°18.7'S, 178°09.1'E, 497-504 m, 4 dd, 2 dd juv. - Stn DW1377, 18°18.4'S, 178°02.5'E, 233-248 m, 1 dd. - Stn DW1383, 18°18.4'S, 178°02.6'E, 230-251 m, 10 dd, 6 dd sub. - BORDAU 1: stn DW1450, 16°44'S, 179°58'E, 327-420 m, 2 dd. - Stn DW1464, 18°09'S, 178°38'W, 285-300 m, 19 dd (holotype and paratypes). - Stn DW1465, 18°09'S, 178°39'W, 290-300 m, 5 dd.

Loyalty ridge. MUSORSTOM 6: stn DW461, 21°06'S, 167°26'E, 240 m, 1 dd. - Stn DW462, 21°05'S, 167°27'E, 200 m, 1 dd. - Stn DW1499, 18°40'S, 178°27'W, 389-400 m, 1 dd.

Tonga. BORDAU 2: stn DW 1540, 21°15'S, 175°14'W, 476-478 m, 1 dd. - Stn DW 1548, 20°38'S, 175°03'W, 476-478 m, 2 dd. - Stn DW1581, 18°41'S, 174°02'W, 76-85 m, 2 dd. - Stn DW1587, 18°37'S, 173°54'W, 309-400 m, 3 dd, 1 dd juv. -Stn DW1589, 18°39'S, 173°54'W, 281 m, 1 dd. - Stn DW1602, 20°49'S, 174°57'W, 263-320 m, 2 dd.

Distribution. South-western Pacific (from New Caledonia to Tonga), 248-344 m.

Diagnosis. A small *Calliotropis* species with moderately high spire, conical shape, silvery pink, with axial ribs on the whole surface, 2 granular spiral cords on first spire whorls, a keel at the abapical cord; 5 spiral cords on last whorl; base with 3 granular spiral cords; umbilicus with 2 or 3 spiral cords inside.

Description. *Shell* of small size for the genus (height up to 4.8 mm, width up to 4.7 mm), almost as broad as high, rather thin, conical or slightly cyrtconoidal: spire moderately high, height 0.9x to 1.1x width, 3.4x to 4.6x aperture height; umbilicus rather narrow. *Protoconch* from 150 to 180 µm, of 1 whorl, more or less glassy, with a very weak terminal varix. *Teleoconch* up to 6 weakly convex whorls, bearing up to 5 spiral granular cords and prosocline ribs; nodules from cords produced by intersections with axial ribs. Suture impressed, not canalculated. First whorl convex, sculptured by about 12 to 15 prosocline smooth ribs, interspace between ribs 1.5x to 2x broader than ribs; primary spiral cords P1 and P3 appearing almost immediately, both weak, poorly visible and granular; P2 absent. On second whorl, P3 slightly stronger than P1 and more visible. On third whorl, beads of P3 slightly blunt sharp, like beads of P1 half a whorl later: axial ribs thicker, more prosocline, distance between them 1.5x broader than ribs. On fourth whorl, beads of both cords stronger; beads of P1 oriented at 45°, beads of P3 horizontally oriented; P1 producing a shoulder with an almost

horizontal ramp and P3 producing a strong keel. At end of fourth or at begin of fifth whorl, P1 dividing into two cords, the abapical one stronger; beads of P3 becoming weakly scaly; S1 appearing at end of fifth whorl or at begin of sixth, weak, granular. On last whorl, P4 emerging from suture, slightly weaker than P1; adapical P1 becoming as strong as abapical P1; P3 the strongest, with blunt scaly beads. Aperture subcircular, inclined backward: outer lip rather thick, meeting inner lip with an obtuse angle. Columella curved at fist third, oblique, with a blunt, more or less conspicuous, basal tooth. Base weakly convex or almost flat, with 3 thick granular spiral cords; distance between cords similar in size to cords; axial ribs between cords, connecting beads of spiral cords. Umbilicus rather narrow, diameter measuring ca. 15% of shell width, rather deep, funnel shaped, with strong axial ribs and 2, sometimes 3, granular spiral cords inside. *Colour* of teleoconch silvery pink to pearly silver; broad, oblique, light brown flames on some specimens from Tonga; protoconch white.

	TW	H	W	HA	H/W	H/HA
holotype	6.1	4.6	4.5	1.0	1.02	4.60
paratype MNHN 1	6.0	4.8	4.7	1.1	1.02	4.36
paratype MNHN 2	5.5	4.2	4.4	1.0	0.95	4.20
paratype MNHN 3	5.9	4.8	4.4	1.4	1.09	3.43
paratype MNHN 4	5.8	4.4	4.3	1.3	1.02	3.38
paratype NMNZ	6.0	4.5	4.4	1.1	1.02	4.09

Table 9. - *Calliotropis echidnoides* : Shells measurements in mm for types.

Discussion. *Calliotropis echidnoides* n. sp. is close to *C. echidna* Jansen, 1994 (Figs 68-69) from eastern Australia, but this slightly taller species has a spire with first part coeloconoidal and second part cyrtconoidal, no S1, all beads of spiral cords strongly spiny and a notch under the basal columellar tooth. The two species occupies adjacent areas whose southern New Caledonia area is the border line. The new species may also be compared to *C. muricata* (Schepman, 1908) (Figs 70-71) from Indonesia, but this species has a more depressed spire, different ontogeny of spiral cords of whorls and two columellar denticles (instead of a single basal tooth). *C. echidnoides* n. sp. also weakly remembers *C. malapascuensis* Poppe, Tagaro & Dekker, 2006, described from a single specimen from Philippines, but this similar in size species has only 3 spiral cords, the nodules of P1 and P2 being much bigger than on the cords of the new species, and only one spiral cord inside the umbilicus.

Etymology. After the close species *C. echidna* Jansen, 1994.

Calliotropis stanyii Poppe, Tagaro & Dekker, 2006
Figs 194-197

Calliotropis stanyii Poppe, Tagaro & Dekker, 2006: 56-57, pl. 21, fig. 1. Type locality: Philippines, off Balicasag, no depth cited.

Material examined. **Solomon Islands.** SALOMON 1: stn CP1798, 9°21.0'S, 160°29.2'E, 513-564 m, 53 lv.

Distribution. Philippines, 242-760 m (Poppe et al., 2006); Solomon Islands, alive in 513-564 m

Remarks. This species was described from Philippines and the record in Solomon Islands is new, giving a distribution that is provisionally disjoint. The weak differences between specimens from Philippines and those from Solomon Is. are that the latter have a less elevated spire, slightly stronger beads on P1 and P2, and a reddish brown colour (not light brown). Almost all of the specimens from Solomon Is. have 3 spiral cords on the base, but we found also at least one

specimen with four, as it happens for the Philippine specimens. Such differences seems not to be significant enough to justify the description of a new subspecies.

***Calliotropis derbiosa* Vilvens, 2004**

Figs 74-75

Calliotropis derbiosa Vilvens, 2004: 22-24, figs. 9-12.
Type locality: Vanuatu, 18°52'S, 168°55'E, 748-775 m.

Material examined. Vanuatu. BIOCAL: stn CP62, 24°19'S, 167°49'E, 1395-1410 m, 1 dd. - MUSORSTOM 8: stn CP992, 18°52'S, 168°55'E, 748-775 m, 2 dd sub, 3 dd juv.

New Caledonia. BIOCAL: stn CP75, 22°19'S, 167°23'E, 825-860 m, 6 dd, 1 dd sub, 1 dd juv.

Loyalty Ridge. MUSORSTOM 6: stn DW488, 20°49'S, 167°06'E, 800 m, 1 dd sub.

Loyalty Basin. BIOGEOCAL: stn DW296, 20°38'S, 167°10'E, 1230-1270 m, 1 dd juv.

Fiji. MUSORSTOM 10: stn DW1331, 17°02.4'S, 178°01.8'E, 694-703 m, 1 dd. - Stn CP1346, 17°19.6'S, 178°32.4'E, 673-683 m, 1 dd juv. - Stn DW1353, 17°30.9'S, 178°53.3'E, 879-897 m, 1 dd. - BORDAU 1: stn DW1413, 16°10'S, 179°24'W, 669-676 m, 14 dd.

Distribution. South-western Pacific (from New Caledonia to Fiji), 800-1230 m (range computed using also the material examined by Vilvens, 2004).

Remarks. Juvenile specimens from New Caledonia seem to be more depressed, but share the same ontogeny of cords as the types (P2 absent, S1 appearing late).

***Calliotropis micraulax* Vilvens, 2004**

Figs 72-73

Calliotropis micraulax Vilvens, 2004: 19-22, figs. 1-4.
Type locality: southern New Caledonia, 22°11'S, 165°59'E, 1060-1450 m.

Material examined. New Caledonia. BIOCAL: stn CP26, 22°40'S, 166°27'E, 1618-1740 m, 1 dd sub, 2 dd juv. - BATHUS 2: stn DW743, 22°36'S, 166°26'E, 713-950 m, 1 dd.

Loyalty Basin. BIOGEOCAL: stn CP214, 22°43'S, 166°28'E, 1590-1665 m, 1 dd sub. - Stn KG222, 22°45'S, 166°25'E, 1675 m, 1 dd juv. - Stn CP232, 21°34'S, 166°27'E, 760-790 m, 2 dd, 5 dd juv. - Stn CP260, 21°00'S, 166°58'E, 1820-1980 m, 2 dd sub, 1 dd juv. - Stn CP273, 21°02'S, 166°57'E, 1920-2040 m, 1 dd.

Loyalty Ridge. MUSORSTOM 6: stn CP438, 20°23'S, 166°20'E, 780 m, 1 dd.

Chesterfield, Coral Sea. MUSORSTOM 5: stn 324, 21°15'S 157°51'E, 970 m, 2 dd sub.

Distribution. South-western Pacific (from Chesterfield to Vanuatu), 780-1280 m (range computed using also the material examined by Vilvens, 2004).

***Calliotropis midwayensis* (Lan, 1990)**

Figs 88-95

Omphalotukaia midwayensis Lan, 1990: 1-3, 1 pl, 3 figs. Type locality: Central Pacific, Midway Islands, 600 m.

Material examined. Taiwan, South China Sea. TAIWAN 2000: stn CP23, 22°11.9'S, 120°02.9'E, 876 m, 10 lv & 2 dd sub. - Stn CP32, 22°01.7'S, 120°16.4'E, 904 m, 1 dd.

Figures 72-87. Scale bar = 5 mm.

72-73. *Calliotropis micraulax* Vilvens, 2004, holotype MNHN, southern New Caledonia, 1060-1450 m [BATHUS 2, stn CP767], 20.1 x 21.7 mm.

74-75. *C. derbiosa* Vilvens, 2004, holotype MNHN, Vanuatu, 748-775 m, [MUSORSTOM 8, stn CP992], 22.3 x 25.4 mm.

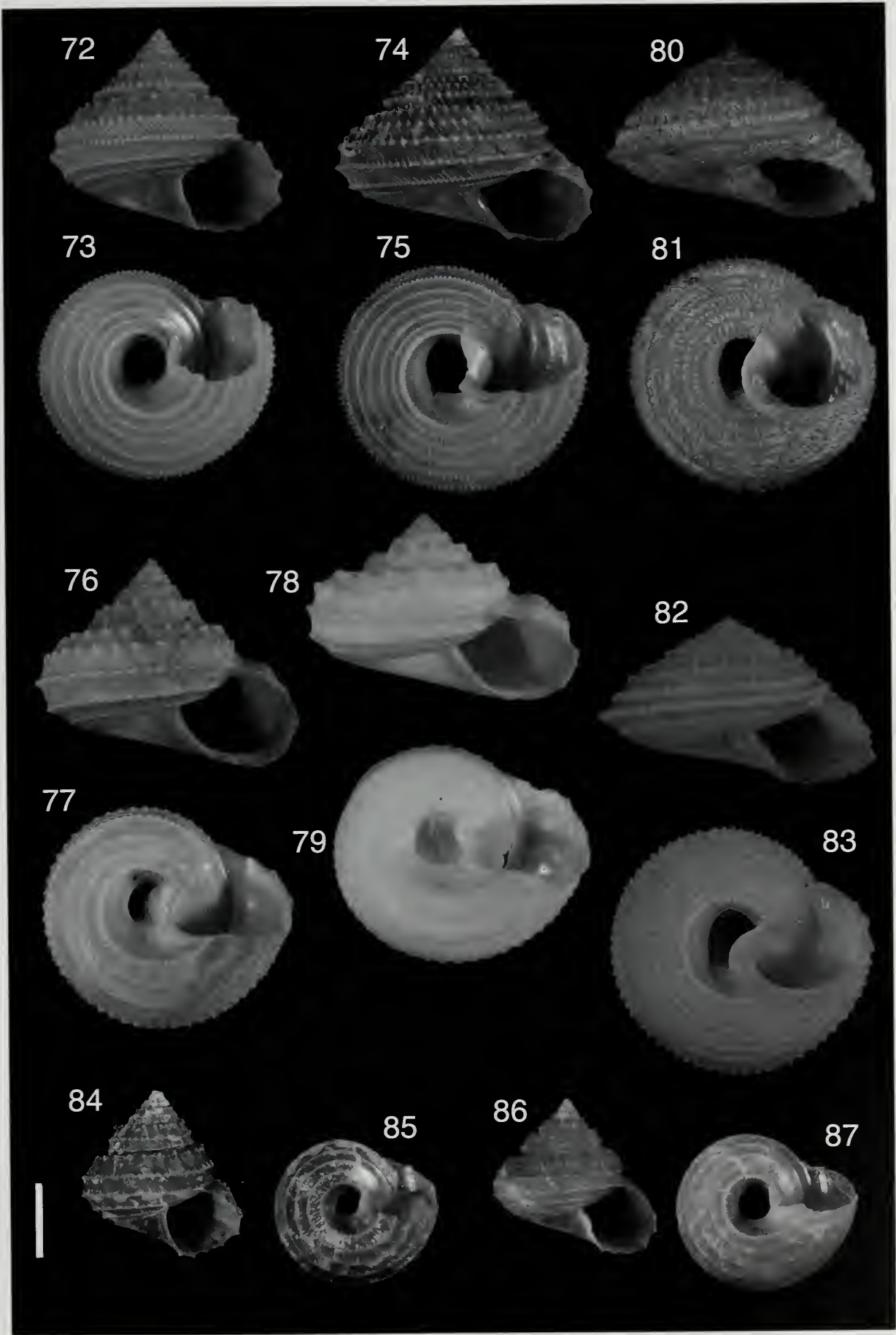
76-79. *C. basileus* Vilvens, 2004.

76-77. Holotype MNHN, Fiji, 556-560 m [BORDAU 1, stn CP1462], 21.8 x 26.3 mm; **78-79.** MNHN, specimen with umbilicus covered by a callus, Norfolk Ridge, 950-980 m [BATHUS 3, stn CP822], 17.7 x 24.4 mm.

80-83. *C. galea* (Habe, 1953), NSMT (Mo.73706), Japan, Honshu, Wakayama Pref. **80-81.** 13.2 x 8.6 mm; **82-83.** 13.8 x 8.5 mm.

84-85. *C. infundibulum* (Watson, 1879), MNHN, Loyalty Basin, 2350 m [BIOGEOCAL, stn CP250], 12.9 x 12.0 mm.

86-87. *C. hataii* Rehder & Ladd, 1973, MNHN, south-western Pacific, 1280-1300 m [MUSORSTOM 7, stn CP621], 12.6 x 13.1 mm.



Distribution. Midway Islands, 600 m and Taiwan, 876-904 m.

Remarks. This species was originally described from the central Pacific as a *Calliostomatidae*, but clearly belongs to the genus *Calliotropis*. Following the original description (types were not available), the main distinguishing features of *Calliotropis midwayensis* (Lan, 1990) are a relatively large size (height about 21 mm), a moderately elevated spire, a teleoconch up to 7 whorls with one subsutural and one peripheral spiral cords, both granular, thick axial ribs, about 7 thin spiral cords on the base and a deep and wide umbilicus without spiral cord inside.

Although there is a huge gap between the area where the Taiwanese material is coming from and the type locality (can one imagine that the types shells were brought by the Taiwanese boat of which dredging revealed the species?), in absence of soft parts, I see no reason to discriminate the examined specimens from *C. midwayensis*.

Some precisions can be given for the examined shells. Regarding the spiral cords on the whorls, P1 and P3 appear at end of first whorl and they become obsolete after the third whorl, P3 disappearing and P1 at most visible as a weak, low cord; P4 appears at third whorl, granular, with widely spaced, small, prickly granules; P2 is absent. Another feature that not appears in the original description is that some specimens develop a columellar callus covering partially or totally the umbilicus (Figs 92-95).

***Calliotropis asphales* n. sp.**

Figs 96-99, Table 10

Type material. Holotype (23.5 x 27.4 mm) MNHN (9849). Paratypes: 4 MNHN (9850).

Type locality. Solomon Islands, SALOMON 1, stn CP1751, 9°10.4'S, 159°53'E, 749-799 m.

Material examined. Solomon Islands. SALOMON 1: stn CP1749, 9°20.9'S, 159°56.2'E, 582-594 m, 3 dd juv. - Stn CP1751, 9°10.4'S, 159°53'E, 749-799 m, 5 lv (holotype and paratypes), 2 dd sub & 4 dd juv. - Stn CP1786, 9°21.3'S, 160°24.6'E, 387 m, 1 lv juv.

Distribution. Solomon Islands, alive in 387-749 m.

Diagnosis. A rather big *Calliotropis* species with a moderately elevated, more or less conical spire, nut-brown, with 3 granular spiral cords on whorls; cords rather similar in strength but with a number of beads on last whorls decreasing from adapical to abapical cord; beads of the two abapical cords scaly; base with 4 or 5 granular spiral cords; large umbilicus without spiral cord inside.

Description. *Shell* of rather large for the genus (height up to 23.8 mm, width up to 27.4 mm), broader than high, rather thick, conical to weakly cyrtocoidal; spire moderately elevated, height 0.8x to 0.9x width, 2.6x to 3.4x aperture height; broad umbilicus.

Protoconch of about 300 µm, of 1 whorl, dome-shaped, without terminal varix, always damaged in large specimens.

Teleoconch up to 7.9 weakly flat to slightly convex whorls, bearing 3 spiral granular cords; nodules from cords produced by intersections with axial ribs that are quickly obsolete after first whorls; secondary thin axial ribs on abapical part of next whorls.

Suture impressed, not canaliculated.

First whorl convex, sculptured by 15 orthocline smooth ribs, interspace between ribs from 2.5x to 3x broader than ribs; primary spiral cords P1 and P3 appearing almost immediately, granular; P1 weaker than P3. On second whorl, P1 and P3 thicker, similar in size; interspace between prosocline ribs 2.5x broader than ribs. On third whorl, P3 slightly stronger than P1, with granules slightly sharp; P4 emerging from suture, granular, similar in strength to P3; P2 absent. On fourth whorl, beads of P3 strongly sharp, oriented at 45°; beads of P4 sharp, 2x more numerous than beads of P3; P1 much weaker than P3 and P4; axial ribs obsolete. On fifth and following whorls, beads of P3 and P4 scaly; beads of P4 much closer to each other; secondary thin axial ribs in subsutural area and between P3 and P4; beads of P1 becoming more visible, large, isolated, not scaly. On last whorl, P4 peripheral; area between P3 and P4 slightly concave.

Aperture subelliptic; outer lip slightly flaring, meeting inner lip with an obtuse, poorly marked angle.

Columella curved at first third, oblique, reflected into umbilicus, without basal tooth.

Figures 88-101. Scale bar = 5 mm.

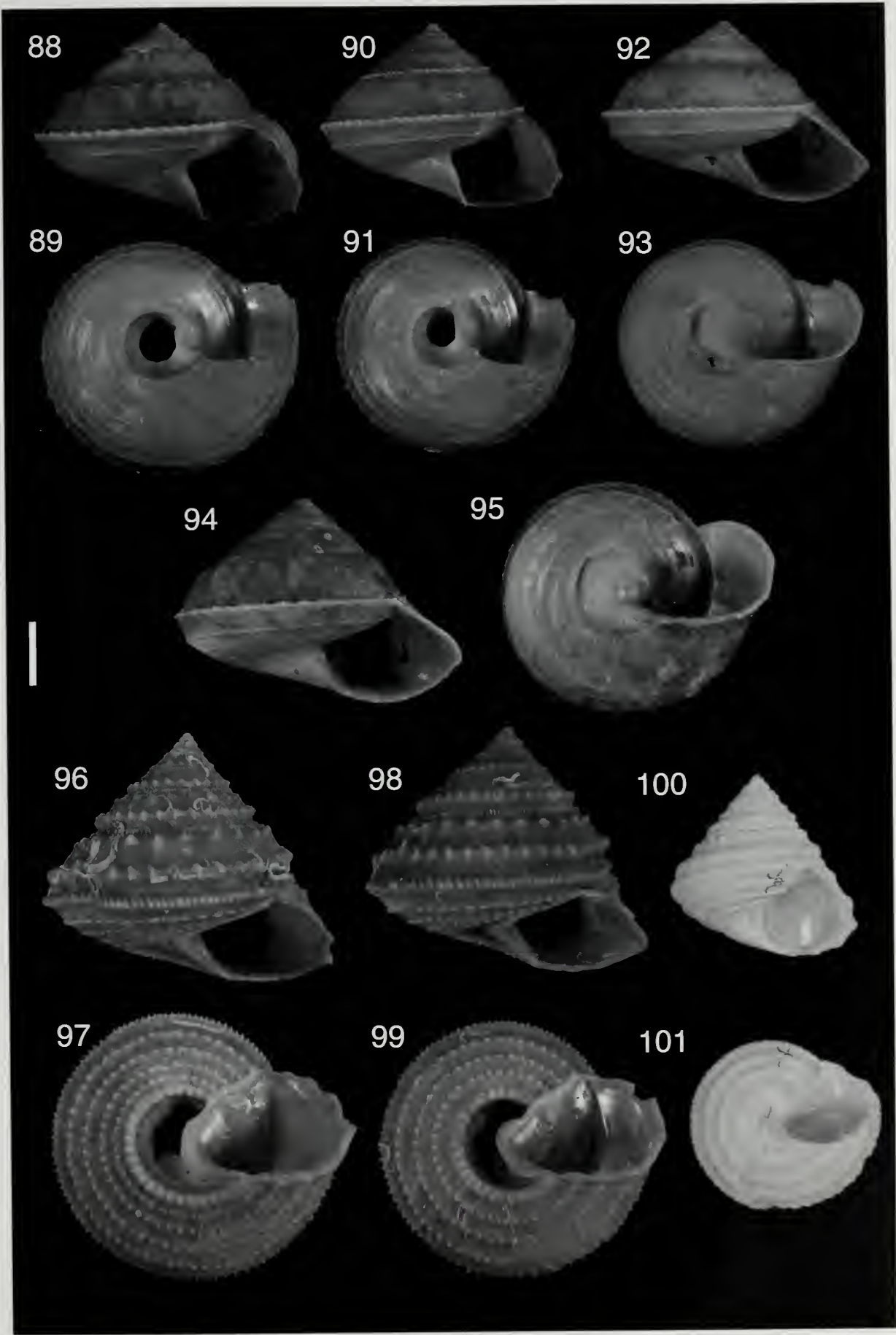
88-95. *Calliotropis midwayensis* (Lan, 1990), MNHN, Taiwan, South China Sea, 876 m [TAIWAN 2000, stn CP23].

88-89. Opened umbilicus, distinct keel, 16.9 x 21.6 mm; **90-91.** Opened umbilicus, globose shape, 14.4 x 18.6 mm; **92-93.** Umbilicus filled by columellar callus, globose shape, 14.5 x 21.0 mm; **94-95.** Umbilicus filled by columellar callus, more distinct keel, 17.0 x 23.1 mm.

96-99. *C. asphales* n. sp., Solomon Islands, 749-799 m [SALOMON 1, stn CP1751].

96-97. Holotype MNHN (9849), 23.5 x 27.4 mm; **98-99.** Paratype MNHN (9850), 23.6 x 27.4 mm.

100-101. *C. granolirata* (Sowerby, 1903), syntype NHM (1903.7.27.65), South Africa, 13.0 x 12.0 mm.



Base moderately convex, with 4 or 5 granular spiral cords, innermost cord stronger and bordering umbilicus; distance between cords more or less similar in size to cords; very thin, crowded axial ribs between cords, not connecting beads of spiral cords (about five in number for one bead).

Umbilicus broad, diameter ca. 30% of shell width, deep, funnel shaped, with thin axial ribs only at rim and without spiral cord inside.
Colour of teleoconch and protoconch nut-brown.

	TW	H	W	HA	H/W	H/HA
holotype	7.9	23.5	27.4	7.0	0.86	3.36
paratype MNHN 1	7.4	23.6	27.4	7.4	0.86	3.19
paratype MNHN 2	7.7	22.8	26.9	6.7	0.85	3.40
paratype MNHN 3	7.4	23.8	26.1	8.3	0.91	2.87
paratype MNHN 4	7.5	19.4	22.6	7.4	0.86	2.62

Table 10. - *Calliotropis asphales* : Shells measurements in mm for types.

Discussion. The combination of a large size, a solid shell with a conical spire, a missing P2 with scaly P3 and P4 makes *Calliotropis asphales* n. sp. hard to confuse with another *Calliotropis* species. Regarding the conical shape and the number of spiral cords, the new species can be compared to *C. micraulax* Vilvens, 2004 (Figs 72-73) from New Caledonia and Vanuatu, but this similar in size species has spiral cords with much thinner, more regular, never scaly beads, thin axial prosocline threads on the whole surface and much thinner spiral cords on the base with wider interspace between them. Considering the same criteria, *C. asphales* n. sp. also remembers *C. granolirata* (Sowerby, 1903) (Figs 100-101) from South Africa, but this slightly smaller species lacks an umbilicus, has a more elevated spire, two abapical spiral cords with prosocline elongated beads and basal spiral cords with axially elongated beads.

Etymology. Strong (Greek : ασφαλής) - with reference to the stocky shape of the shell.

Calliotropis glypta (Watson, 1879)
Figs 204-207

Trochus glyptus Watson, 1879: 694. Type locality: South-western Australia, New South Wales, off Sydney. 34°13'S, 151°38'E, 750 m.
Other references :
Calliotropis glyptus - Marshall, 1979: figs. 2J-L.
Calliotropis glyptus - Kaicher, 1990: 5694.
Calliotropis glypta - Jansen, 1994: 44-46, pl. 1, figs. a-b.
Calliotropis glyptus - Vilvens, 2004: figs. 5-6.

Material examined. New Caledonia. BATHUS 2(MUSORSTOM 8?): stn unknown, 1 dd. Fiji. MUSORSTOM 10: stn DW1314, 17°16.1'S, 178°14.8'E, 656-660 m, 2 dd, 1 dd juv. Vanuatu. MUSORSTOM 8: stn DW1128, 16°02'S, 166°38'E, 778-811 m, 1 dd.

Distribution. South-western Pacific (from eastern Australia to Fiji), 660-835 m (range computed using also the material examined by Jansen, 1994).
Remarks. This species was originally described from New South Wales (off Sydney). The new records extend the distribution area. The only differences of these new specimens with Australian specimens and the original description are an intermediate spiral cord P2 stronger than usual and 6 (not 5) spiral cords on the base.

Calliotropis basileus Vilvens, 2004
Figs 76-79

Calliotropis basileus Vilvens, 2004: 24-26, figs. 13-16. Type locality: Fiji, 18°09'S, 178°44'W, 556-560 m.
Material examined. New Caledonia. BATHUS 3: stn CP822, 23°20'S, 167°57'E, 950-980 m, 1 dd.
Distribution. South-western Pacific (from New Caledonia to Fiji), 750-830 m (range computed using also the material examined by Vilvens, 2004).

Remarks. This ivory specimen has a more depressed spire and a umbilicus fully (not partially) closed by a septum, but match all other distinctive criteria of the species.

Calliotropis blacki Marshall, 1979
Figs 198-201

Calliotropis blacki Marshall, 1979: 527, figs. 2M-O. Type locality: Kermadec Islands (Raoul Is.), 29°16.5'S, 177°49.5'W, 512-549 m.
Other references :
Calliotropis blacki - Vilvens, 2004: figs. 7-8.
Calliotropis blacki - Vilvens, 2005: figs. 13-14.

Material examined. New Caledonia. MUSORSTOM 4: stn DC168, 18°48'S, 163°11'E, 720 m, 2 dd. - Fiji. BORDAU 1: stn CP1415, 16°31'S, 179°00'W, 670-682 m, 1 dd. - Stn DW1458, 17°22'S, 179°28'W, 1216-1226 m, 1 dd. - Wallis Island. MUSORSTOM 7: stn DW578, 13°08'S, 176°16'W, 640-730 m, 1 dd, 2 dd juv.

Distribution. South-western Pacific (from New Caledonia to Fiji and Kermadec Is.), 549-720 m (range computed using also the material examined by Marshall, 1979).

Calliotropis pistis n. sp.
Figs 176-179, Table 11

Type material. Holotype (9.3 x 11.5 mm) MNHN (9851). 2 paratypes MNHN (9852).

Type locality. New Caledonia, Loyalty Ridge, MUSORSTOM 6, stn CP438, 20°23'S, 166°20'E, 780 m.

Material examined. New Caledonia. MUSORSTOM 4: stn DC168, 18°48'S, 163°11'E, 720 m, 1 dd.
Loyalty Ridge. MUSORSTOM 6: stn CP438, 20°23'S, 166°20'E, 780 m, 1 dd (holotype). - BATHUS 3: stn DW776, 23°44'S, 170°08'E, 770-830 m, 2 dd (paratypes). - Stn DW777, 24°44'S, 170°07'E, 770-800 m, 1 dd.
Norfolk Ridge. BATHUS 3: stn DW790, 23°49'S, 169°48'E, 685-715 m, 1 dd juv.

Distribution. New Caledonia area, 715-780 m.

Diagnosis. A medium size *Calliotropis* species with a moderately elevated, cyrtconoidal spire, a subangular periphery and 6 granular spiral cords with sharp beads on last whorl; 3 adapical cords similar in size and number of beads; size of beads of cords decreasing in size and number of them increasing from fourth cord to sixth cord; thin, crowded, somewhat lamellose, prosocline threads between cords; base slightly convex with 8 or 9 granular spiral cords; broad umbilicus without spiral cord inside.

Description. *Shell* of medium size for the genus (height up to 10.1 mm, width up to 12.8 mm), broader than high, rather thin, slightly cyrtconoidal; spire

moderately elevated, height 0.8x width, 2.6x to 2.9x aperture height; broad umbilicus.
Protoconch of about 350 µm, of 1 whorl, glassy, without distinct terminal varix.
Teleoconch up to 6.0 convex whorls, bearing up to 6 prickly spiral cords different in size; nodules from cords produced on first whorls by intersections with axial ribs; axial sculpture on last whorls consisting in thin, crowded, prosocline threads in area between spiral cords.
Suture visible, weakly canaliculated.
First whorl convex, sculptured by about 15 slightly prosocline smooth ribs; interspace between ribs ca. 2x broader than ribs; primary cord P3 appearing almost immediately; P2 appearing at mid whorl, weaker than P3; beads of cords already bluntly sharp at mid whorl for P3, at end for P2. On second whorl, P2 and P3 stronger, spiny, similar in size. On third whorl, P1 appearing, staying weaker than other cords; P2 closer to P1 than to P3; beads of P2 and P3 similar in size and very acutely pointed; interspace between ribs 2x broader than ribs. On fourth whorl, S1 separating from P1; beads of P3 more pointed than those of other cords; P4 emerging from suture, beads more or less similar in size to those of P2. On fifth whorl, P1 dividing into two similar cords; beads of P3 and P4 slightly more numerous than those of other cords; primary axial sculpture becoming obsolete, crowded prosocline threads appearing in whole area between P3 and P4, and partially between P2 and P3. On last whorl, P4 peripheral; three adapical cords closely packed; beads of spiral cords decreasing in strength and size from adapical to abapical cord, crowded beads of P4 about 2x more numerous and smaller than those of P1 and S1; thin, prosocline threads present on almost the whole surface between all cords.
Aperture subcircular; outer lip thin, meeting inner lip with an obtuse angle.
Columella more or less straight, oblique, without tooth.
Base moderately convex, with 8 or 9 granular spiral cords; distance between cords similar in size to cords; axial ribs between spiral cords very weak, connecting beads of spiral cords.
Wide umbilicus, diameter measuring ca. 25% of shell width, deep, funnel shaped, with rather steep sloping walls and without spiral cord within.
Colour of teleoconch and protoconch light brown.

	TW	H	W	HA	H/W	H/HA
holotype	5.9	9.3	11.5	3.6	0.81	2.58
paratype MNHN 1	5.9	10.0	12.9	3.4	0.78	2.94
paratype MNHN 2	5.7	9.3	11.1	3.4	0.84	2.74
specimen DC168	6	10.1	12.9	3.8	0.78	2.66

Table 11. - *Calliotropis pistis* : Shells measurements in mm for types and some specimens.

Discussion. The new species has obvious differences regarding allied species whose characteristics are constant. That is, *Calliotropis pistis* is close to *C. blacki* Marshall, 1979 (Figs 198-201) from Kermadec Islands and New Caledonia, but this slightly bigger species lacks the spiral cord S1 and has only 4 spiral cords on the base. Also, *C. pistis* is close to *C. abyssicola* Rehder & Ladd, 1973 from central Pacific, but this species (of which all specimens described lacks protoconch and first whorl) is more depressed and has only up to 4 spiral cords on the last whorl.

The new species may remember *C. keras* n. sp. (Figs 212-213) from Fiji and Tonga, but this species is much more depressed, always lacks the spiral cord S1, has only 5 spiral cords on the base and a spiral cord inside the umbilicus.

The new species may also be compared to *C. derbiosa* Vilvens, 2004 (Figs 74-75) from Vanuatu and Fiji, but this species has a conical or slightly coeloconoidal shape, only 4 spiral cords on the whorls and only 6 spiral cords on the base.

Etymology. Loyalty (Greek: $\pi\sigma\tau\iota\varsigma$), used as a noun in apposition - with homonymous reference to type locality of the new species.

Calliotropis boucheti

Poppe, Tagaro & Dekker, 2006
Figs 208-209

Calliotropis boucheti Poppe, Tagaro & Dekker, 2006: 57-58, pl. 22, fig. 3. Type locality: Philippines, Mindoro, 13°44'N, 120°32'E, 682-770 m.

Material examined. Taiwan, South China Sea. TAIWAN 2000: stn DW46, 22°51.9'S, 121°25.3'E, 554 m, 1 dd.

Distribution. Philippines, 682-770 m and Taiwan, 554 m.

Remarks. This single specimen, with a protoconch damaged, matches the original description of the Philippine species, except that it has 5 (not 4) spiral cords on the base and a spiral cord inside the umbilicus.

Calliotropis dicrous n. sp.

Figs 202-203, Table 12

Type material. Holotype (10.2 x 12.9 mm) MNHN (9853). Paratypes : 2 MNHN (9854).

Type locality. Solomon Islands, SALOMON 1, stn CP1858, 9°37.0'S, 160°41.7'E, 435-461 m.

Material examined. Solomon Islands. SALOMON 1: stn CP1751, 9°10.4'S, 159°53'E, 749-799 m, 4 dd sub. - Stn CP1858, 9°37.0'S, 160°41.7'E, 435-461 m, 3 dd, 1 dd juv (with holotype and paratypes).

Distribution. Solomon Islands, 461-749 m.

Diagnosis. A beige *Calliotropis* species of moderate size, with a coeloconoidal, moderately high spire, an angulated periphery and 2 granular spiral cords on whorls, respectively subsutural and median on first spire whorls and both suprasutural on last whorls; base with 4 or 5 granular spiral cords; broad umbilicus without spiral cord inside.

Description. *Shell* of medium size for the genus (height up to 10.2, width up to 12.9 mm), broader than high, rather thin, coeloconoidal; spire moderately elevated, height 0.8x width, 3.6x to 3.9x aperture height; broad umbilicus.

Figures 102-119. Scale bar = 5 mm.

102-105. *Calliotropis cycloides* n. sp.

102-103. Holotype MNHN (9870), 392-407 m [BORDAU 1, stn DW1463], 5.0 x 7.1 mm; **104-105.** Paratype MNHN (9872), 402-410 m [BORDAU 1, stn DW1423], 4.9 x 7.1 mm.

106-107. *C. bucina* Vilvens, 2006, MNHN, Solomon Islands, 513-564 m [SALOMON 1: DW1768], 2.8 x 5.1 mm.

108-111. *C. coopertorium* n. sp.

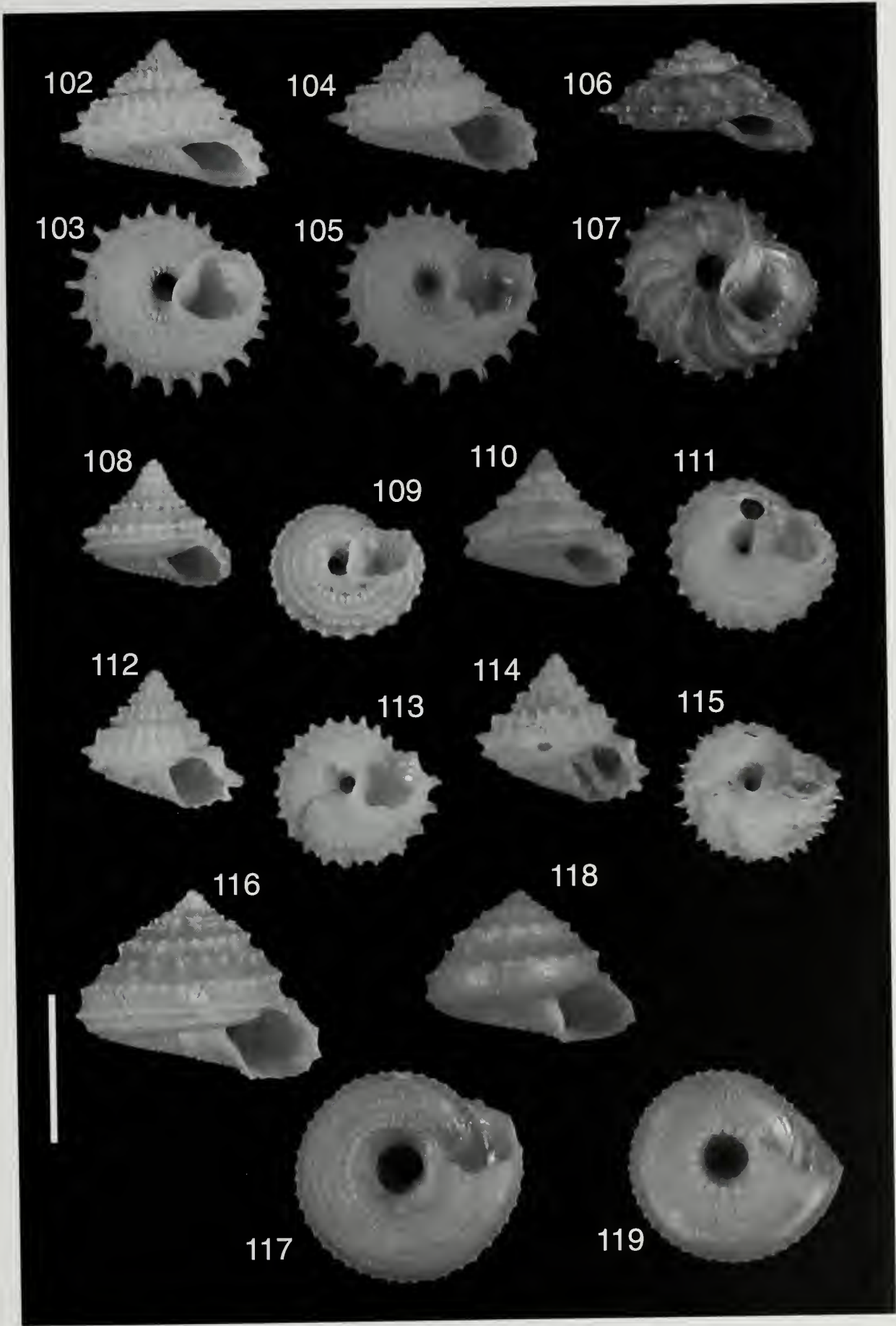
108-109. Holotype MNHN (9860), 295-302 m [MUSORSTOM 10, stn DW1365], 2.8 x 3.3 mm; **110-111.** MNHN, Vanuatu, 205-210 m [MUSORSTOM 8, stn CP1101], 2.9 x 3.5 mm.

112-115. *C. pyramoeides* n. sp.

112-113. Holotype MNHN (9858), 200 m [MUSORSTOM 6, stn DW442], 3.6 x 3.9 mm; **114-115.** Paratype MNHN (9859), 240 m [MUSORSTOM 6, stn DW461], 3.6 x 3.9 mm.

116-119. *C. scalaris* Lee & Wu, 2001.

116-117. MNHN, Indonesia, Tanimbar Islands, 603-620 m [KARUBAR, stn CC57], 6.1 x 7.8 mm; **118-119.** MNHN, New Caledonia, 600-620 m [BATHUS 4: stn DW891], 4.4 x 5.4 mm.



Protoconch of about 400 µm, of 1 whorl, without terminal varix.

Teleoconch up to 6.4 convex whorls, bearing up to 3 spiral granular cords different in size; nodules from cords produced by intersections with axial ribs; axial sculpture on first whorls, reduced to thin, crowded, scaly ribs on last whorls.

Suture visible, impressed, not canaliculated.

First whorl convex, sculptured by about 15 prosocline smooth ribs; interspace between ribs about 1.5x broader than ribs; primary cords P1 and P3 appearing almost immediately, similar in size. On second whorl, P1 and P3 stronger, beads of cords bluntly sharp; interspace between ribs 2x broader than ribs. On third whorl, both cords with pointed beads; beads of P3 oriented at 30°, beads of P1 oriented at 75°; P4 emerging weakly from suture after mid of whorl, granular, much weaker than P1 and P3; P2 absent; axial ribs becoming weaker, interspace between ribs 2.5x broader than ribs. On fourth whorl, P1 becoming obsolete, P3 with strong nodules well spaced; beads of P4 twice more numerous than beads of P3; axial sculpture

disappearing except between P3 and P4. On fifth whorl, beads of P3 and P4 scaly; beads of P4 three times more numerous than beads of P3; axial ribs transforming into scaly threads between P3 and P4, and in subsutural area. On last whorls, beads of P4 crowded, axially elongated, 5 times more numerous than beads of P3; subsutural ribs more numerous and scaly, extending near P3 on sixth whorl.

Aperture subquadrangular; outer lip thin, with a median angle and meeting inner lip with a marked angle of about 120°.

Columella more or less straight, oblique, without tooth.

Base moderately convex, with 4 (or sometimes 5) granular spiral cords, innermost cord slightly stronger, bordering umbilicus; distance between cords 2x size of cords; thin, scaly, crowded axial ribs between spiral cords.

Umbilicus wide, diameter ca. 25% to 30% of shell width, deep, funnel shaped, with crowded, thin axial ribs and without spiral cord inside.

Colour of teleoconch beige; protoconch off white.

	TW	H	W	HA	H/W	H/HA
holotype	6.4	10.2	12.9	2.6	0.79	3.92
paratype MNHN 1	5.5	7.6	9.4	2.1	0.81	3.62
paratype MNHN 2	5.3	7.0	8.5	1.9	0.82	3.68

Table 12. - *Calliotropis dicrouis* : Shells measurements in mm for types.

Discussion. The combination of a coeloconoidal shape, a spiral cord P2 absent, crowded thin axial threads and two abapical cords very different in size and shape for *Calliotropis dicrouis* n. sp. makes it hard to confuse with another *Calliotropis* species. The only one rather close to the new species is *C. boucheti* Poppe, Tagaro & Dekker, 2006 (Figs 208-209) from Philippines, but this similar in size species has a conical shape, a subangulate periphery, an aperture with a rounded outer lip, an existing spiral cord P2 and the two abapical spiral cords of the whorls evenly spaced, similar in size, with similar knobs.

Etymology. Biconical, with two tips (Greek : δίκροος) - with reference peculiar shape of the shell that remembers a biconical potery.

Calliotropis scalaris Lee & Wu, 2001
Figs 116-119

Calliotropis scalaris Lee & Wu, 2001: 11, fig. 2. Type locality: South China Sea, Pratas Islands, 400-500 m.

Material examined. Indonesia, Tanimbar Islands. KARUBAR: stn CC56, 08°16'S, 131°59'E, 549-552 m, 1 dd. - Stn CC57, 08°19'S, 131°53'E, 603-620 m, 5 dd. - Stn CP7, 08°38'S, 131°44'E, 477-480 m, 1 dd.

New Caledonia. BATHUS 2: stn CP743, 22°36'S, 166°26'E, 713-950 m, 1 dd. - BATHUS 4: stn DW891, 21°01'S, 164°28'E, 600-620 m, 1 dd.

Distribution. South China Sea, 400-500 m (Lee & Wu, 2001); eastern Indonesia, 480-603 m; New Caledonia, 620-713 m.

Remarks. This species (for which request to borrow types never succeeded) was originally described from South China Sea, with as main distinguishing features (considering mainly pictures of the original description) 3 spiral cords on the whorls (P3 the most prominent, P2 absent) and about 6 spiral cords on the base, the cord around umbilicus stronger. The two New Caledonian specimens are significantly smaller for the same number of whorls, have lower, weaker spiral cords on the base and the walls of umbilicus steeper. Although there is a huge gap between locality type and the two area here recorded, it is hard to discriminate the examined specimens from *C. scalaris*. Only additional material and examination of holotype and paratypes of the reference species (especially regarding ontogeny of spiral cords) could maybe lead to describe a new species or subspecies for the new recorded specimens.

Calliotropis denticulus n. sp.
Figs 248-251, Table 13

Type material. Holotype (7.0 x 9.5 mm) MNHN (9855). Paratypes : 3 MNHN (9856 & 9857).

Type locality. New Caledonia, Norfolk Ridge, BATHUS 3, stn CP844, 23°06'S, 166°46'E, 908 m.

Material examined. New Caledonia. BIOCAL: stn CP55, 23°20'S, 167°30'E, 1160-1175 m, 1 dd juv. - Stn CP63, 24°28'S, 168°08'E, 2160 m, 1 dd. - BIOGEOCAL: stn CP260, 21°00'S, 166°58'E, 1820-1980 m, 1 dd, 1 dd sub, 2 dd juv. - BATHUS 1: stn DE694, 20°36'S 164°58'E, 400-500 m, 2 dd sub. - BATHUS 2/MUSORSTOM 8, 1 dd (paratype 9857), 2 dd sub. - BATHUS 3: stn CP844, 23°06'S, 166°46'E, 908 m, 3 dd (holotype and paratypes 9856).

Distribution. New Caledonia, 500-2160 m.

Diagnosis. A pinkish to greyish white *Calliotropis* species of moderate size, rather depressed, with a coeloconoidal adapical part and a cytoconoidal abapical part, up to 4 thin spiral cords on whorls; base with 6 to 8 thin granular spiral cords and rather stronger axial ribs; very wide umbilicus without spiral cord inside.

Description. *Shell* of moderate size for the genus (height up to 7.4, width up to 11.6 mm), broader than high, rather thin, coeloconoidal in upper part, cytoconoidal in lower part; spire rather depressed, height 0.8x width, 3.7x to 4.4x aperture height; very broad umbilicus.

Protoconch of from 400 to 450 µm, of 1 whorl, with a rather thin terminal varix.

Teleoconch up to 5 convex whorls, bearing up to 4 thin spiral granular cords, all similar in size except the

stronger adapical one; nodules from cords produced by intersections with axial ribs; primary axial sculpture on first whorls, reduced to secondary thin ribs on last whorls.

Suture impressed, not canaliculated.

First whorl convex, sculptured by about 15 thick, prosocline, smooth ribs; interspace between ribs about 2.5x broader than ribs; primary cords P1 and P3 appearing almost immediately, similar in size. On second whorl, P1 and P3 stronger, beads of P3 sharp. On third whorl, both cords with pointed beads; beads of P3 acutely sharp, oriented at 30°, beads of P1 bluntly sharp, almost vertically oriented, stronger than beads of P3 near end of whorl; P2 absent. On fourth whorl, P1 stronger than P3, with less numerous beads (2 beads of P1 for 3 beads of P3); P4 emerging weakly from suture, granular, much weaker than and P3, with less numerous beads (3 beads of P3 for 4 beads of P3); S1 appearing, quickly similar in size to P3; axial ribs becoming obsolete. On last whorl, P1 still strong with sharp beads, other cords thin; number of beads increasing in number from P1 to P4 (ratio of 2 beads of P1 for 3 of S1, 4 of P3 and 5 of P4); secondary thin axial ribs appearing on whole surface.

Aperture subelliptic; outer lip thin, meeting inner lip with an obtuse angle of about 120°.

Columella more or less straight, oblique, without tooth.

Base slightly convex, with 6 to 8 thin granular spiral cords, innermost cord slightly stronger, bordering umbilicus; distance between cords 1.5x size of cords; rather strong axial ribs between spiral cords, distance between ribs similar in size to ribs.

Umbilicus very wide, diameter ca. 35% of shell width, deep, funnel shaped, with same axial ribs as on base, without spiral cord inside.

Colour of teleoconch and protoconch pinkish to greyish white; brown periostracum.

	TW	H	W	HA	H/W	H/HA
holotype	4.7	7.0	9.5	1.6	0.74	4.38
paratype MNHN CP844 1	4.9	5.4	7.7	1.3	0.70	4.15
paratype MNHN CP844 1	5.0	6.1	7.4	1.6	0.82	3.81
paratype MNHN BATHUS2	5.0	7.4	11.6	2.0	0.64	3.70

Table 13. - *Calliotropis denticulus* : Shells measurements in mm for types.

Discussion. *Calliotropis denticulus* n. sp. is rather close to *C. reticulina* (Dall, 1895) from off Hawaii and Japan, but this species has a greater H/H ratio, beads of P3 and P4 much broader and less numerous and a less wide umbilicus.

The new species is also close to *C. abyssicola* Rehder & Ladd, 1973 from Central Pacific, but this species is different for the same reasons as them relative to *C. reticulina*; moreover, this species has a canaliculated suture.

C. denticulus n. sp. remembers *C. keras* n. sp. (Figs 212-213) from Fiji and Tonga, but this similar in size species has a more depressed spire, thicker cors on the whorls, less numerous and different in shape spiral cords on the base and a narrower umbilicus.

Etymology. Lace (Latin), used as a noun in apposition - with reference to the delicate sculpture of the shell.

Calliotropis delli Marshall, 1979

Figs 58-61

Calliotropis delli Marshall, 1979: 528-529, figs. 3D-G, tab. 3. Type locality: Kermadec Islands (Raoul Is.), 29°14.7'S, 177°49.4'W, 146-165 m.

Other references :

Calliotropis delli - Poppe, Tagaro & Dekker, 2006: 58, pl. 22, fig. 1.

Material examined. **New Caledonia.** BIOCAL: stn DW08, 20°34'S, 166°54'E, 435 m, 3 dd, 1 dd juv. - Stn DW38, 23°00'S, 167°15'E, 360 m, 1 dd, 1 dd juv. - Stn DW44, 22°47'S, 167°14'E, 440-450 m, 1 dd. - Stn DW46, 22°53'S, 167°17'E, 570-610 m, 20 dd & 10 dd juv. - Stn DW48, 23°00'S, 167°29'E, 775 m, 2 dd. - Stn DW66, 24°55'S, 168°22'E, 505-515 m, 2 dd. - MUSORSTOM 4: stn DW156, 18°54'S, 163°19'E, 525 m, 2 dd. - Stn DW197, 18°51'S, 163°21'E, 550 m, 1 lv. - Stn DW220, 22°58.50', 167°38.30'E, 1 dd. - Stn DW223, 18°S, 163°E, 545-560 m, 1 dd. - CHALCAL 2: stn DW76, 23°40'S, 167°45'E, 470 m, 1 dd juv. - Stn DW76, 23°40'S, 167°45'E, 470 m, 10 dd, 2 dd juv. - CALSUB: stn PL15, 20°37'S, 166°56'E, 538 m, 1 dd. - BERYX 11: stn DW10, 24°53'S, 168°21'E, 565-600 m, 1 dd. - SMIB 8: stn DW148, 24°56'S, 168°21'E, 510 m, 1 dd. - Stn DW166, 23°38'S, 167°43'E, 433-450 m, 11 dd, 5 dd sub, 3 dd juv. - Stn DW167, 23°38'S, 167°43'E, 430-452 m, 1 lv sub, 6 lv juv. - Stn DW169, 23°37'S, 167°42'E, 447-450 m, 2 dd, 1 dd juv. - Stn DW193-196, 22°52'S-23°S, 167°20'-168°22'E, 491-558 m, 6 dd. - BATHUS 2: stn DW719, 22°48'S, 167°16'E, 444-445 m, 3 dd, 2 dd sub. - Stn DW720, 22°52'S, 167°16'E, 530-541 m, 2 dd, 1 dd juv. - Stn DW721, 22°54'S, 167°17'E, 525-547 m, 5 lv. - Stn DW732, 22°50'S, 166°25'E, 236-264 m, 1 dd. - BATHUS 3: stn DW809, 23°39'S, 167°59'E, 650-730 m, 1 dd. - BATHUS 4: stn DW914, 18°49'S, 163°15'E,

600-616 m, 2 dd, 2 dd sub, 8 dd juv. - Stn DW919, 18°50'S, 163°17'E, 610-660 m, 5 dd. - Stn DW927, 18°56'S, 163°22'E, 444-452 m, 11 lv. - Stn DW931, 18°55'S, 163°24'E, 360-377 m, 1 lv. - Stn DW918, 18°49'S, 163°16'E, 613-647 m, 1 dd. - Stn DW942, 19°04'S, 163°27'E, 264-270 m, 1 dd, 1 dd sub. **Chesterfield.** MUSORSTOM 5: stn 362, 19°53'S, 158°40'E, 410 m, 2 dd. - Stn 378, 19°54'S, 158°38'E, 355 m, 1 dd.

Loyalty ridge. BIOGEOCAL: stn DW307, 20°35'S, 166°55'E, 470-480 m, 1 dd sub. **Loyalty basin.** MUSORSTOM 6: stn DW410, 20°38'S, 167°07'E, 490 m, 1 dd.

Fiji. MUSORSTOM 10: stn DW1390, 18°18.6'S, 178°05.1'E, 234-361 m, 1 dd juv. - BORDAU 1: stn DW1488, 19°01'S, 178°25'W, 500-516 m, 3 dd.

South-western Pacific, Wallis Island. MUSORSTOM 7: stn DW601, 13°19'S, 176°17'W, 350 m, 10 dd, 2 dd juv.

Tonga. BORDAU 2: stn DW 1548, 20°38'S, 175°03'W, 476-478 m, 2 dd.

Distribution. South-western Pacific (from Chesterfield to Tonga), 350-490 m (range computed using also the material examined by Marshall, 1979).

Remarks. Following the original description, the main distinguishing features of *C. delli* Marshall, 1979 are a very small size (height about 3.5 mm), a moderately elevated spire with up to 6.5 whorls, 2 nodular, similar in size spiral cords on whorls (more explicitly: P1 at adapical third, separated from the suture by a subsutural ramp, P2 absent and P3 nearly peripheral at abapical quarter), axial ribs on the whole surface (primary axial ribs widely spaced, narrower secondary ribs in the subsutural ramp), 4 or 5 granular spiral cords on the base, a deep, rather narrow umbilicus with one thin beaded spiral cord inside, an aperture inclined backward.

Figures 120-137. Scale bar = 5 mm.

120-123. *Calliotropis oros* n. sp., Fiji.

120-121. Holotype MNHN (9862), 441-443 m [MUSORSTOM 10, stn DW1382], 4.2 x 6.1 mm; **122-123.** Paratype MNHN (9863), 441-443 m [MUSORSTOM 10, stn DW1382], 5.4 x 6.2 mm.

124-129. *C. oros marquesensis* n. ssp., Marquesas Islands.

124-125. Holotype MNHN (9875), 500-525 m [MUSORSTOM 9, stn DW1207], 6.4 x 9.4 mm; **126-127.**

Paratype MNHN (9876), 500-525 m [MUSORSTOM 9, stn DW1207], 5.8 x 9.0 mm; **128-129.** MNHN, 660-680 m [MUSORSTOM 9, stn DW1272], 6.4 x 10.1 mm.

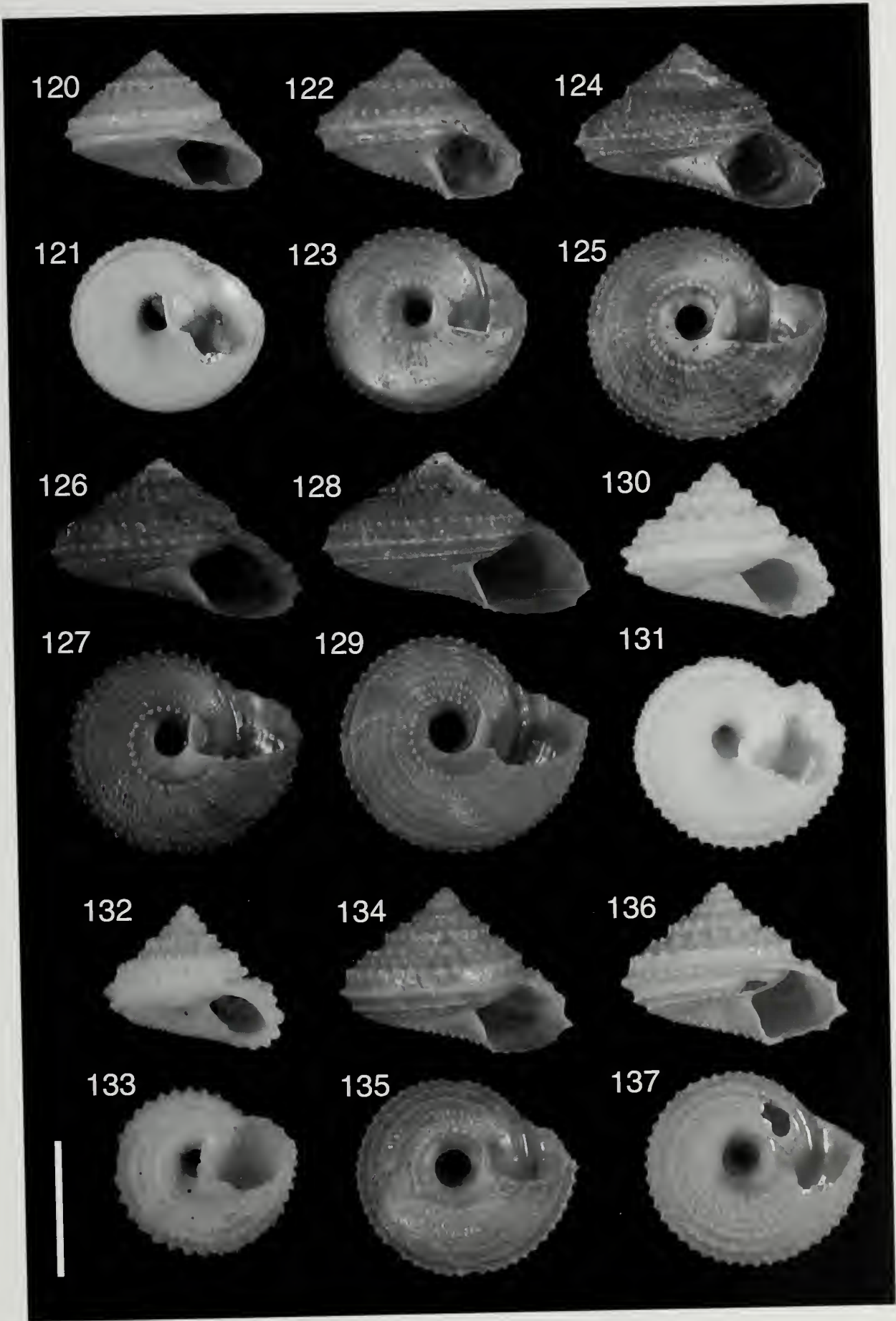
130-133. *C. zone* n. sp., New Caledonia.

130-131. Holotype MNHN (9866), 39 m [PALEO-SURPRISE: stn DW1396], 4.8 x 6.1 mm; **132-133.**

Paratype MNHN (9867), 300 m [MUSORSTOM 4: stn DW227], 4.3 x 5.8 mm.

134-137. *C. hysterea* n. sp.

134-135. Holotype MNHN (9864), 900-980 m [BIOCAL, stn DW80], 5.8 x 7.6 mm; **136-137.** MNHN, New Caledonia, 1060-1130 m [HALIPRO 2, stn BT102], 5.2 x 7.0 mm.



I don't know any other reference to this species and there is no indication about the variability of the shell. Specimens studied here match the original description, except that P3 is not so low on the whorls (at abapical third instead quarter) and a P4 is clearly visible on last whorl (the original description doesn't state explicitly the presence of P4, but use a "3d spiral" as reference of extension of the axial ribs). Also some specimens have only 3 spiral cords on the base (e.g. specimens BATHUS 4, stn DW914, stn DW918 and stn DW927), but maybe the original description took into account of basal cords the last spiral cord P4 of the last whorl. Anyway, informations about animal are lacking and the small differences regarding the shells seem not enough to justify a categorisation of these specimens into a new species.

Calliotropis pyramoeides n. sp.
Figs 112-115, Table 14

Type material. Holotype (3.6 x 3.9 mm) MNHN (9858). Paratype MNHN (9859).

Type locality. Loyalty ridge, MUSORSTOM 6, stn DW442, 20°54'S, 167°17'E, 200 m.

Material examined. Loyalty ridge, MUSORSTOM 6: stn DW442, 20°54'S, 167°17'E, 200 m, 1 lv (holotype). - Stn DW461, 21°06'S, 167°26'E, 240 m, 1 dd (paratype).
Southern New Caledonia. VAUBAN: stn 40, 22°30'S, 166°24'E, 250-350 m, 1 dd, 2 dd juv.

Distribution. South-western Pacific (New Caledonia area), alive at 200 m, shells in 250-350 m.

Diagnosis. A small *Calliotropis* species with a moderately elevated, conical spire, white, with 2 nodular spiral cords on spire whorls, both with sharp nodules, the abapical cord the strongest; one additional, sharp granular spiral cord on last whorl;

base with 3 granular spiral cords; umbilicus with 2 spiral cords inside.

Description. *Shell* of small size for the genus (height up to 3.6 mm, width up to 3.9 mm), more or less as high as broad, conical; spire moderately elevated, height 0.9x to 1.0x width, 4.4x to 4.5x aperture height; moderately broad umbilicus.

Protoconch of ca 200 µm, of 1 whorl, glassy, bulbous, without discernable terminal varix.

Teleoconch up to 5.7 convex whorls, bearing 3 spiral granular cords; nodules from cords produced by intersections with axial ribs still visible on last whorls. Suture impressed, not canaliculated.

First whorl convex, sculptured by 15 slightly prosocline smooth ribs, interspace between ribs at least 3x broader than ribs; primary spiral cords P2 appearing at end of whorl, P1 half a whorl later, both granular; P1 weaker than P2. On second whorl, cords similar in size, with granules becoming slightly sharp. On third whorl, beads of both cords more strongly sharp; beads of P1 oriented at 45°, beads of P2 horizontally oriented; P1 making keel with a shoulder at first quarter of whorl, subsutural ramp almost horizontal; P3 partially emerging from suture, granular, weaker than other cords; axial ribs very prominent. On fourth whorl, spines of P1 and P2 scaly, P2 stronger than P1. On last whorl, P3 peripheral, weaker than other cords, with more closely packed granules; axial ribs still visible, connecting spines of P1 and P2.

Aperture quadrangular; outer lip rather thin, meeting inner lip with an obtuse angle.

Columella straight, oblique, without tooth.

Base weakly convex, with 3 thick granular spiral cords; distance between cords smaller than cords.

Umbilicus moderately broad, diameter ca. 25% of shell width, deep, funnel shaped; low, thick axial ribs and 2 thick granular spiral cords within.

Colour of teleoconch and protoconch white.

	TW	H	W	HA	H/W	H/HA
holotype	5.7	3.6	3.9	0.8	0.92	4.50
paratype MNHN	5.6	3.6	3.9	0.8	0.92	4.50
specimen NC	5.3	3.1	3.1	0.7	1.00	4.43

Table 14. - *Calliotropis pyramoeides* : Shells measurements in mm for types and specimen.

Discussion. *Calliotropis pyramoeides* n. sp. is close to *C. grata* Thiele, 1925 from eastern Africa, but this similar in size species has a cyrtokonoidal shape, P2 closer to P3 than to P1, 4 spiral cords on the base and no visible spiral cords inside the umbilicus; the beads of P2 are smaller than those of the new species and are only scaly, not sharp.
The new species may also be compared to *C. muricata* (Schepman, 1908) (Figs 70-71) from Indonesia, but

this species has a cyrtokonoidal shape, 4 spiral cords on last whorls with not spiny beads and two columellar denticles.
C. pyramoeides n. sp. also weakly remembers *C. malapascuensis* Poppe, Tagaro & Dekker, 2006 from Philippines, but this species has nodules of P1 and P2 that are much stronger, of the same size and not spiny nor scaly; it has only one spiral cord inside the umbilicus.

Etymology. Pyramidal (Greek : πυραμοειδής) - with reference to the shape of the spire of the shell.

Calliotropis coopertorium n. sp.
Figs 108-111, Table 15

Type material. Holotype (2.8 x 3.3 mm) MNHN (9860). Paratypes: 7 MNHN (9861), 2 NMNZ (M.273552), 1 coll. C.Vilvens.

Type locality. Fiji, MUSORSTOM 10, stn DW1365, 18°12.7'S, 178°32.4'E, 295-302 m.

Material examined. **Fiji.** MUSORSTOM 10: stn DW1365, 18°12.7'S, 178°32.4'E, 295-302 m, 11 dd (holotype and paratypes). - Stn DW1370, 18°18.7'S, 178°09.1'E, 497-504 m, 2 lv. - Stn DW1390, 18°18.6'S, 178°05.1'E, 234-361 m, 12 lv.
Vanuatu. MUSORSTOM 8: stn CP1101, 15°04'S, 167°08'E, 205-210 m, 3 dd.

Distribution. South-western Pacific (from Vanuatu to Fiji), alive in 361-497 m, shells in 210-497 m.

Diagnosis. A small *Calliotropis* species with a moderately elevated, coeloconoidal spire, white or light brown, with 2 granular spiral cords on spire whorls, both close to suture, the abapical cord the strongest with sharp granules; one additional, granular spiral cord on last whorl; base with 3 granular spiral cords; very large umbilicus with 3 spiral cords inside.

Description. *Shell* of small size for the genus (height up to 2.9 mm, width up to 3.5 mm), broader than high, rather thin, coeloconoidal; spire moderately elevated, height 0.8x to 0.9x width, 3.0x to 4.1x aperture height; broad umbilicus.
Protoconch of about 150 µm, of 1 whorl, bulbous, with a weak thin terminal varix.

Teleoconch up to 5.5 weakly flat to slightly concave whorls, bearing 3 spiral granular cords; nodules from cords produced by intersections with axial ribs that are nearly obsolete on last whorls.
Suture impressed, not canaliculated.
First whorl convex, sculptured by 20 slightly prosocline smooth ribs, interspace between ribs about 2x broader than ribs; primary spiral cords P3 appearing at first half and P1 at end of whorl, granular; P1 weaker than P3. On second whorl, P3 the strongest, with granules becoming slightly sharp; axial ribs broader but weaker. On third whorl, beads of P3 more strongly sharp, horizontally oriented; P4 emerging from suture, granular, similar in strength to P1; P2 absent; axial ribs becoming obsolete. On fourth whorl, P1 stronger than P4, still much weaker than P3; beads of P1 slightly sharp, adapically oriented. On last whorls, P3 the strongest, P1 and P4 more or less similar in size, granules of P4 slightly closer to each other; S1 may appear on some specimens, quickly similar in size to P1 or even thicker.
Aperture subelliptic, oblique, slightly declivous; outer lip rather thick, meeting inner lip with an obtuse, poorly marked, angle.
Columella curved in the middle, slightly reflected into umbilicus, with one weak basal tooth, only obvious in large specimens .
Base moderately convex, with 3 granular spiral cords, innermost cord stronger and bordering umbilicus; distance between cords similar in size to cords; more or less visible axial ribs between cords, connecting beads of spiral cords.
Umbilicus broad, diameter ca. 30% of shell width, deep, funnel shaped, with gently sloping walls, weak axial ribs and 3 granular spiral cords within.
Colour of teleoconch white, sometimes with brownish flames; protoconch white.

	TW	H	W	HA	H/W	H/HA
holotype	5.5	2.8	3.3	0.7	0.85	4.00
paratype MNHN 1	5.1	2.8	3.3	0.8	0.85	3.50
paratype MNHN 2	5.4	2.9	3.4	0.8	0.85	3.63
paratype MNHN 3	5.4	2.8	3.2	0.9	0.88	3.11
paratype MNHN 4	5.2	2.7	3.2	0.9	0.84	3.00
paratype MNHN 6	5.2	2.5	3.2	0.8	0.78	3.13
paratype MNHN 8	5.1	2.4	3.2	0.7	0.75	3.43
paratype MNHN 9	4.8	2.2	2.6	0.7	0.85	3.14
paratype NMNZ 1	5.1	2.8	3.1	0.8	0.90	3.50
paratype NMNZ 2	5.1	2.3	2.9	0.7	0.79	3.29
paratype CV	5.1	2.4	2.9	0.7	0.83	3.43
specimen Vanuatu	5.5	2.9	3.5	0.7	0.83	4.14

Table 15. - *Calliotropis coopertorium* : Shells measurements in mm for types and specimen.

Discussion. The combination of a small size, a coelonoidal spire and a missing P2 makes *Calliotropis coopertorium* n. sp. hard to confuse with another *Calliotropis* species, except maybe with *C. echidna* Jansen, 1994 (Figs 68-69) from eastern Australia, but this species has a spire with a first part coeloconoidal and second part cyrtconoidal, and 4 thick spiny spiral cords (P2 is present).

Etymology. Cover (Latin : coopertorium, -i), used as a noun in apposition - after the shape of the spire of the shell remembering the cover of an arabian pan.

Calliotropis oros n. sp.
Figs 120-123, Table 16

Type material. Holotype (4.2 x 6.1 mm) MNHN (9862). Paratypes: 4 MNHN (9863).

Type locality. Fiji, MUSORSTOM 10, DW1382, 18°19.25'S, 177°51.7'E, 441-443 m.

Material examined. Fiji. MUSORSTOM 10: stn CP1376, 18°18.7'S, 178°09.1'E, 497-504 m, 1 dd. - Stn DW1382, 18°19.25'S, 177°51.7'E, 441-443 m, 6 dd, 1 dd juv (with holotype and paratypes). - BORDAU 1: stn CP1396, 16°39'S, 179°57'W, 591-596 m, 12 lv. - Stn CP1407, 16°40'S, 179°39'W, 499-527 m, 14 lv, 30 dd sub.

New Caledonia. BATHUS 4: CP948, 533-610 m, 20°33'S, 164°57'E, 3 dd.

Distribution. South-western Pacific (from New Caledonia to Fiji), alive in 527-591 m, shells in 443-591 m.

Diagnosis. A small *Calliotropis* species with a moderately elevated, conical to slightly cyrtconoidal spire, white or brownish white, with 2 main granular spiral cords on spire whorls, the apical cord close to suture and the other at third quarter of the height of whorl; additional, weak, granular spiral cords between the two main cords and an additional, peripheral, granular spiral cord on last whorl; base with about 7 granular spiral cords; rather broad umbilicus with one weak spiral cord inside.

Description. *Shell* of small size for the genus (height up to 5.4 mm, width up to 6.2 mm), broader than high, rather thin, conical to slightly cyrtconoidal; spire moderately elevated, height 0.7x to 0.9x width, 3.6x to 4.7x aperture height; rather broad umbilicus.

Protoconch of about 250 µm, of 1 whorl, glassy, bulbous, with a very weak thin terminal varix.

Teleoconch up to 4.9 weakly flat to slightly convex whorls, bearing 6 spiral granular cords different in size; nodules from cords produced by intersections with axial ribs that are weaker but still visible on last whorls.

Suture impressed, weakly canaliculated.

First whorl convex, sculptured by 14 or 15 orthocone smooth, rather thick ribs, interspace between ribs from 1.5x to 2x broader than ribs; primary spiral cords P1 and P3 appearing almost immediately, granular, similar in size. On second whorl, P3 stronger than P1; axial ribs broader, interspace between ribs 2x broader than ribs. On third whorl, beads of cords bluntly sharp; P4 emerging from suture, granular, similar in size to P3; P2 absent; axial ribs becoming obsolete in central area of whorl. At begin of fourth whorl, up to 3 tertiary cords appearing, very thin, much weaker than P1 and P3, uppermost one granular. On last whorl, P4 peripheral, almost so strong as P3, giving a bicarinate shape to the whorl; tertiary cords possibly granular on large specimens.

Aperture subcircular, possibly slightly declivous (holotype); outer lip thin, meeting inner lip with a distinct angle.

Columella curved in the middle, slightly reflected into umbilicus, without tooth.

Base slightly convex, with 7 or 8 granular spiral cords; innermost cord stronger, with sharp granules, bordering umbilicus; outermost cord isolated, stronger than other cords except innermost cord; distance between inner cords smaller than size of cords, between outer cords similar in size to cords; axial ribs connecting beads of spiral cords.

Umbilicus broad, diameter ca. 25% of shell width, deep, funnel shaped, with rather steep sloping walls, axial ribs and one thin, granular spiral cord within.

Colour of teleoconch nacreous brownish white; protoconch translucent.

Figures 138-155. Scale bar = 5 mm.

138-155. *Calliotropis eucheloides* Marshall, 1979, MNHN.

138-145. Typical form with granular basal cords.

138-141. New Caledonia, 440 m [BIOCAL, stn DW77]; **138-139.** 7.9 x 12.3 mm; **140-141.** 8.6 x 11.3 m.

142-143. Tonga Islands, 407-443 m [BORDAU 2, stn DW1631], 8.2 x 12.1 mm. **144-145.** Solomon Islands, 200-303 m [SALOMON 1, stn DW1769], 7.5 x 10.7 mm.

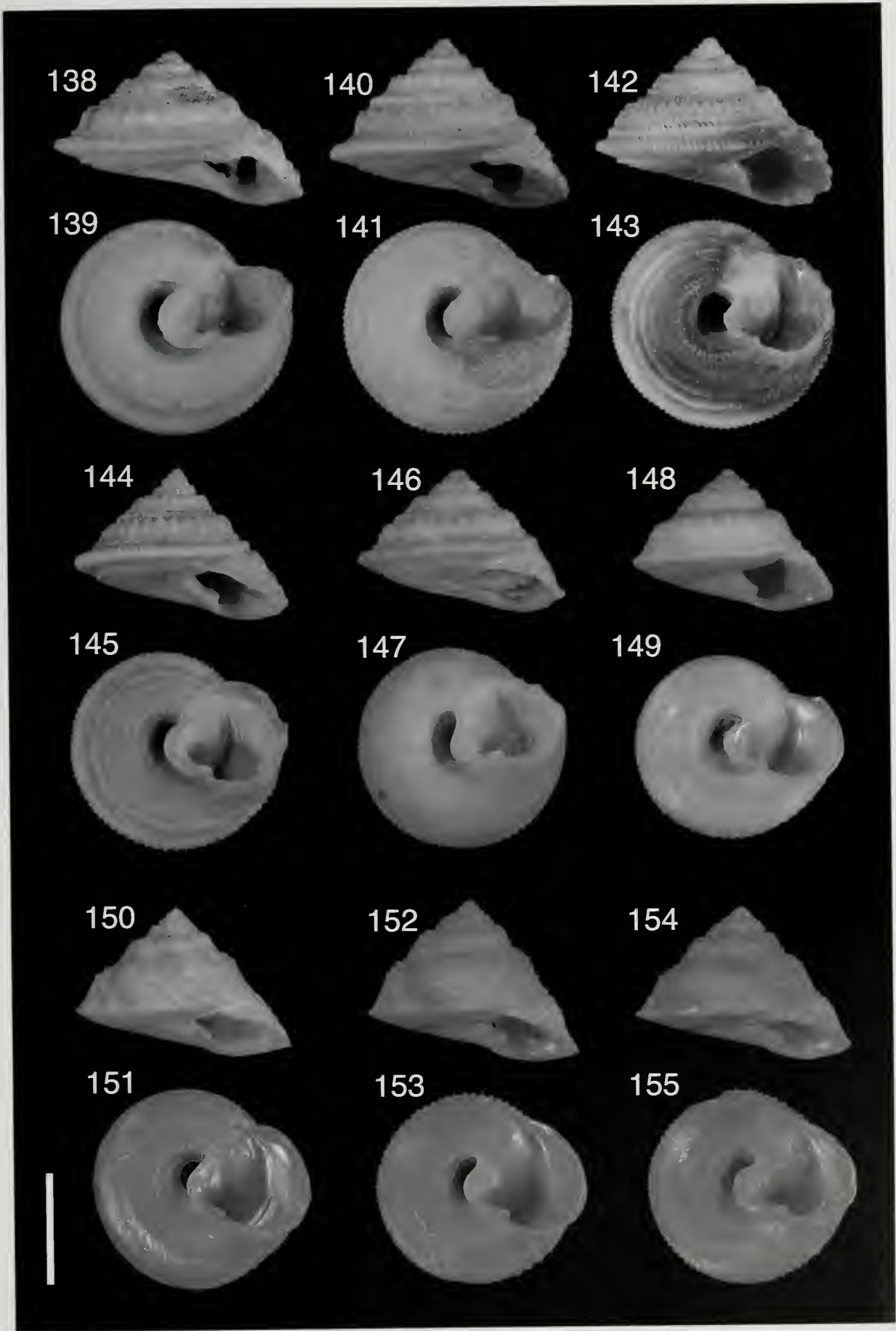
146-147. Intermediate form with weakly granular basal cords, New Caledonia, 525 m [MUSORSTOM 4, stn DW162], 7.2 x 10.4 mm.

148-151. Intermediate form with smooth basal cords.

148-149. New Caledonia, 405 m [SMIB 3, stn DW29], 6.0 x 8.4 m; **150-151.** New Caledonia, 343-400 m [NORFOLK 1, stn DW1737], 7.2 x 8.9 mm.

152-155. Smooth base form, New Caledonia, 444-452 m [BATHUS 4: stn DW927].

152-153. 7.3 x 9.3 mm; **154-155.** 7.2 x 10.4 mm.



	TW	H	W	HA	H/W	H/HA
Holotype	4.7	4.2	6.1	0.9	0.69	4.67
paratype MNHN 1	4.9	5.4	6.2	1.4	0.87	3.86
paratype MNHN 2	4.7	4.5	5.4	1.1	0.83	4.09
paratype MNHN 3	4.4	4.0	5.6	1.1	0.71	3.64
paratype MNHN 4	4.5	4.2	5.4	1.0	0.78	4.20

Table 16. - *Calliotropis oros* : Shells measurements in mm for types.

Discussion. The combination of a small size, a nearly conical spire and a large area between P1 and P3 makes *Calliotropis oros* n. sp. hard to confuse with another *Calliotropis* species, except maybe with *C. scalaris* Lee & Wu, 2001 (Figs 116-119) from South China Sea and Indonesia, but this slightly bigger species has a cyrtoidal spire with more convex whorls, a P3 not so close to P4 (at second third of whorl), no tertiary cords, less spiral cords on the base and no spiral cord inside the umbilicus.

Regarding the number of spiral cords on the whorls and on the base, the new species may also be compared to *C. abyssicola* Rehder & Ladd, 1973 from central Pacific, but this bigger species has a cyrtoidal spire with more convex whorls, a intermediate primary cord nearly median on the whorls and no spiral cord inside the umbilicus.

Regarding the conical shape of the shell, *C. oros* n. sp. may remember *C. reticulina* (Dall, 1895) from Hawaii and Japan, but in this slightly larger species, P2 is not lacking and there is no spiral cord inside the umbilicus.

The new species may also remember *C. francocacii* Poppe, Tagaro & Dekker, 2006 from Philippines, but this similar in size species has a more elevated spire, a nearly median intermediate primary cord, beads of the three primary cords bigger and less numerous, no tertiary spiral cords between P3 and P4 and only 4 spiral cords on the base.

Etymology. Mountain (Greek : ορος), used as a noun in apposition - with reference of the more or less conical shape of the shell.

Calliotropis hysterea n. sp.

Figs 134-137

Type material. Holotype (5.8 x 7.6 mm) MNHN (9864). Paratype (5.5 x 7.0) MNHN (9865).

Type locality. New Caledonia, BIOCAL, stn DW80, 20°32'S, 166°48'E, 900-980 m.

Material examined. New Caledonia. BIOCAL: stn DW80, 20°32'S, 166°48'E, 900-980 m, 3 dd, 1 dd sub, 3 dd juv (holotype and paratype). - BATHUS 1: stn CP651, 21°42'S, 166°40'E, 1080-1180 m, 1 dd sub, 3

dd juv. - HALIPRO 2: stn BT102, 24°31'S, 161°52'E, 1060-1130 m, 1 dd.

Chesterfield. MUSORSTOM 5: stn 321, 21°20'S 158°02'E, 1000 m, 1 dd, 1 dd juv.

Distribution. South-western Pacific (from Chesterfield to New Caledonia), 980-1080 m.

Diagnosis. A rather small *Calliotropis* species with a moderately elevated, about conical spire, broad protoconch and convex whorls, white or brownish white, with 2 main granular spiral cords on spire whorls, up to 4 granular spiral cords on last whorl, the abapical main cord peripheral; base with 6 granular spiral cords; broad umbilicus without spiral cord inside.

Description. *Shell* of moderate size for the genus (height up to 5.8 mm, width up to 7.6 mm), broader than high, rather thin, conical to slightly cyrtoidal; spire moderately elevated, height 0.8x width, 3.9x to 4.6x aperture height; broad umbilicus.

Protoconch from 360 to 400 µm, of at least 1 whorl, glassy, dome shaped, without clearly visible terminal varix.

Teleoconch up to 5 convex whorls, bearing up to 4 spiral granular cords; nodules from cords produced by intersections with axial ribs; axial sculpture still visible, but weak, on last whorls.

Suture impressed, canaliculated except on last whorls. First whorl convex, sculptured by 12 to 14, orthocline, smooth, moderately thick ribs; interspace between ribs 2.5x to 3x broader than ribs; primary spiral cords P1 appearing almost immediately and P2 half a whorl later, similar in size. On second whorl, P2 stronger than P1; axial ribs slightly broader, interspace between ribs 2.5x broader than ribs. On third whorl, P1 and P2 stronger; beads of cords bluntly sharp; P3 emerging weakly from suture at end of whorl, granular, smaller than P3. On fourth whorl, P1 and P2 much stronger and axial threads weaker than on preceding whorl; sharp beads of P1 oriented at about 75°, sharp beads of P2 slightly thicker and oriented at 45°, beads of P3 weaker, more numerous and more closely packed than those of P1 and P2. On last whorl, S1 appearing on most specimens, much weaker than P1 and P2, nearly smooth for half a whorl, weakly granular at end of whorl; P3 weaker than P2, peripheral.

Aperture subcircular to subelliptic; outer lip thin, meeting inner lip with an obtuse, marked angle.

Columella more or less straight, oblique, without tooth.

Base convex, with 6 rather granular spiral cords, similar in size except the third (counting from the outermost) thinner and the innermost slightly stronger, bordering umbilicus; distance between cords from 1x to 1.5x size of cords; axial ribs between spiral cords, connecting beads of innermost cords.

Umbilicus broad, diameter ca. 30% of shell width, deep, funnel shaped, with rather strong axial ribs and without spiral cord inside.

Colour of teleoconch and protoconch nacreous white.

Discussion. *Calliotropis hysterea* n. sp. may remember juvenile specimens of *C. derbiosa* Vilvens, 2004 from south-western Pacific, but this species has a more elevated spire, its beads of the spiral cords of the whorls and of the base in this species are much more rounded and more closely packed, the axial ribs are stronger and much more close.

The new species is rather close to *C. calatha* (Dall, 1927) from western Atlantic, but this bigger species, of which the extreme variability was pointed out by Quinn (1979), has a spiral cord P2 with more numerous, more closely packed, only weakly sharp beads, and only 3 or 4 spiral cords on the base.

Etymology. Late (Greek : ὕστερος) - with reference to the spiral cord S1 appearing late.

Calliotropis zone n. sp.
Figs 130-133, Table 17

Type material. Holotype (4.8 x 6.1 mm) MNHN (9866). Paratypes: 2 MNHN (9867).

Type locality. New Caledonia, PALEO-SURPRISE, stn DW1396, 18°20.7'S, 163°04.7'E, 39 m.

Material examined. New Caledonia. MUSORSTOM 4: stn DW227, 22°46'S, 167°20'E, 300 m, 2 dd (paratypes). - MUSORSTOM 6: stn DW459, 21°01'S, 167°31'E, 425 m, 2 lv, 3 dd juv. - SMIB 8: stn DW169, 23°37'S, 167°42'E, 447-450 m, 1 dd. - BATHUS 1: stn DW688, 20°33'S, 165°00'E, 270-282 m, 1 dd, 1 dd juv. - BATHUS 2: stn DW717, 22°44'S, 167°17'E, 350-393 m, 4 dd, 10 dd juv. - Stn DW724, 22°48'S, 167°26'E, 344-358 m, 3 dd. - Stn DW749, 22°33'S, 166°26'E, 233-258 m, 2 dd. - BATHUS 3: stn DW838, 23°01'S, 166°56'E, 400-402 m, 3 dd. - PALEO-SURPRISE: stn DW1396, 18°20.7'S, 163°04.7'E, 39 m, 1 dd (holotype).

Fidji. MUSORSTOM 10: stn CP1325, 17°16.4'S, 177°49.8'E, 282-322 m, 1 dd juv. - Stn CP1384, 18°18.5'S, 178°05.8'E, 260-305 m, 1 dd. - Stn DW1388, 18°18.5'S, 178°01.8'E, 313-446 m, 4 dd & 1 dd juv. - BORDAU 1: stn CP1421, 17°08'S, 178°59'W, 403-406 m, 1 dd.

Taiwan. TAIWAN 2000: stn DW34, 22°01.9'S, 120°36.4'E, 246 m, 1 dd.

Distribution. South-western Pacific (from New Caledonia to Fiji), alive at 425 m, shells in 305-403 m; Taiwan, 246 m.

Diagnosis. A small *Calliotropis* species with a moderately elevated, a cyrtococonoidal spire, white or brownish white, with 2 main granular spiral cords on spire whorls, up to 5 granular spiral cords on keeled last whorl, the abapical main cord peripheral; base with 3 granular spiral cords; broad umbilicus with 3 spiral cords inside.

Description. Shell of small size for the genus (height up to 4.8 mm, width up to 6.1 mm), broader than high, moderately thick, slightly cyrtococonoidal; spire moderately elevated, height 0.7x to 0.8x width, 4.4x to 5.4x aperture height; broad umbilicus.

Protoconch of about 150 µm, of 1 whorl, bulbous, without clearly visible terminal varix.

Teleoconch up to 5.7 convex whorls, bearing 6 spiral granular cords different in size; nodules from cords produced by intersections with axial ribs; axial sculpture still visible on last whorls.

Suture impressed, weakly canaliculated.

First whorl convex, sculptured by 12 or 14 weakly prosocline smooth, moderately thick ribs, interspace between ribs about 2x broader than ribs; primary spiral cords P1 and P3 appearing at end of whorl, poorly distinct, similar in size. On second whorl, P3 stronger than P1, P1 still rather indistinct; axial ribs slightly broader, interspace between ribs 2x broader than ribs. On third whorl, P1 and P3 stronger; beads of cords bluntly sharp; P2 absent. On fourth whorl, P1 and P3 much stronger, with very different shape: nodules of P3 sharp, sometimes scaly, horizontally oriented, and nodules of P1 thicker, bluntly sharp, axially elongated, oriented at 45°; thin axial threads appearing on the subsutural ramp; P4 emerging weakly from suture at end of whorl, granular, smaller than P3. On fifth whorl, S1 appearing, granular, much weaker than P1 and P3; P1 dividing in two cords half a whorl later; sharp beads of P3 more numerous and more closely packed than nodules of P1. On last whorl, P4 only slightly weaker than P3, giving a bicarinate shape to the whorl.

Aperture subelliptic, possibly slightly declivous (paratypes); outer lip rather thick, meeting inner lip with an obtuse, poorly marked angle.

Columella curved in the middle, slightly reflected into umbilicus, with a weak basal tooth in largest specimens (paratypes).

Base moderately convex, with 3 rather thick granular spiral cords; innermost cord slightly stronger; distance between cords similar in size to cords; axial ribs between spiral cords, connecting beads of cords.

Umbilicus broad, diameter ca. 30% of shell width, deep, funnel shaped, with gently sloping walls, rather

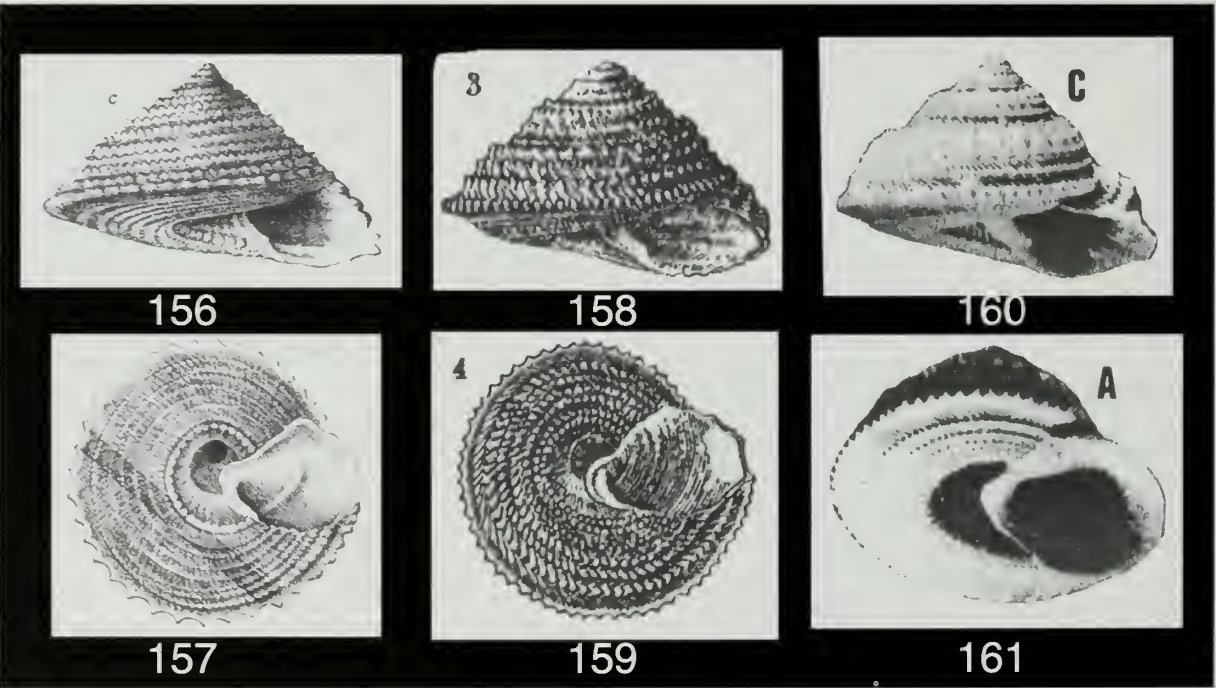
thick axial ribs and 3, sometimes 4, granular spiral cords within. *Colour* of teleoconch and protoconch brownish white.

	TW	H	W	HA	H/W	H/HA
holotype	5.5	4.8	6.1	0.9	0.79	5.33
paratype MNHN 1	5.7	4.3	5.8	0.8	0.74	5.38
paratype MNHN 2	5.7	4.0	5.1	0.9	0.78	4.44

Table 17. - *Calliotropis zone* : Shells measurements in mm for types.

Discussion. *Calliotropis zone* n. sp. is close to *C. muricata* (Schepman, 1908) (Figs 70-71) from Indonesia, but this similar in size species has a more elevated spire, similar thick, blunt beads on the adapical and abapical main spiral cords, a more convex base and only 2 spiral cords inside the umbilicus.
The new species may also be compared to *C. cycloides* n. sp. (Figs 102-105) from Fiji and New Caledonia, but this species has broader protoconch, a different ontogeny of cords (especially with P1 appearing very late) and a spiral cord P3 with very spiny, widely spaced nodules.
The new species is also superficially similar to *C. eucheloides* Marshall, 1979 (Figs 138-155, 160-161) from Indo-Pacific, but this slightly larger species has a

very different general shape with bell-shape last whorls and a prominent adapical, peripheral spiral cord with closely packed, axially elongated beads; this widespread species has 6 spiral cords on the base.
Remarks. One can wonder about the Taiwanese record of this new Caledonian species, but the specimen, although encrusted, shows clearly the descriptive ontogeny of the spiral cords at the same time on the whorls, on the base and inside the umbilicus.
Etymology. Crossbelt (Greek : ζώνη), used as a noun in apposition - with reference to the strong peripheral spiral cord on the last whorl of the shell.



Figures 156-161

156-157. *Calliotropis calcarata* (Schepman, 1908), drawings of the original description (pl.IV, fig 2b-c).
158-159. *C. galea* (Habe, 1953), drawings of the original description (p.135, fig 3-4).
160-161. *C. eucheloides* Marshall, 1979, pictures of the original description (p.541, figs 3A,C).

Calliotropis oregmene n. sp.
Figs 186-189, Table 18

Type material. Holotype (5.6 x 7.9 mm) MNHN (9868). Paratypes : 4 MNHN (9869).

Type locality. Fiji, Bligh Water, MUSORSTOM 10: stn CP1342, 16°46'S, 177°39.7'E, 650-701 m.

Material examined. **Fiji.** MUSORSTOM 10: stn CP1342, 16°46'S, 177°39.7'E, 650-701 m, 5 lv, 1 dd sub (with holotype and paratypes). - BORDAU 1: stn DW1459, 17°18'S, 179°33'W, 820-863 m, 9 lv, 4 dd juv. - Stn DW1485, 19°03'S, 178°30'W, 700-707 m, 45 dd, 50 juv.

Distribution. Fiji, alive in 701-820 m.

Diagnosis. A small ivory white *Calliotropis* species with a rather depressed, cyrtconoidal spire, a transversally elongated aperture, 2 granular spiral cords on first whorls and 4 granular, more or less similar in size, spiral cords on last whorl; brown periostracum; base with 4 spiral cords; broad umbilicus with very gently sloping walls and without spiral cord inside.

Description. *Shell* of small size for the genus (height up to 5.7 mm, width up to 7.9 mm), broader than high, rather thin, conical to slightly coeloconoidal; spire moderately elevated, height 0.7x to 0.8x width, 3.3x to 3.9x aperture height; broad umbilicus. *Protoconch* of about 350 µm, of 1 whorl, glassy, without clearly visible terminal varix. *Teleoconch* up to 5.2 convex whorls, bearing up to 4 spiral granular cords similar in size; nodules from

cords produced by intersections with axial ribs; axial sculpture only weakly visible on last whorl near nodules of spiral cords. Suture impressed, canaliculated. First whorl convex, sculptured by 16 to 18 prosocline, smooth, moderately thick ribs; interspace between ribs about 2x broader than ribs. Primary spiral cords P1 appearing at begin of second whorl and P3 about a quarter of whorl later, poorly distinct, similar in size. On third whorl, P3 slightly stronger than P1; beads of cords becoming sharp; P2 absent; P4 emerging weakly from suture at end of whorl, granular, similar to P3; axial ribs weaker than on preceding whorl. On fourth whorl, P1 and P3 stronger, with nodules sharp, well spaced: nodules of P3 oriented at 30°, nodules of P1 almost vertically oriented; axial sculpture obsolete; S1 appearing, nodular like other cords. On last whorl, P4 slightly weaker then P3, giving a bicarinate shape to the whorl; nodules of P4 sharp, almost horizontally oriented. Aperture subelliptic, transversally elongated; outer lip rather thick, meeting inner lip without distinct angle. Columella more or less straight, with expansion covering partly umbilicus, without basal tooth. Base almost flat, slightly convex, with 4 spiral cords; outermost and innermost cord granular, with sharp granules, two other cords subgranular, with smaller beads; distance between cords about 2x size of cords; axial ribs between spiral cords obsolete or almost absent. Umbilicus very wide, diameter from 35% to 40% of shell width, shallow, funnel shaped, with very gently sloping walls, thin axial ribs and no spiral cord within. *Colour* of teleoconch and protoconch ivory white; periostracum brown.

	TW	H	W	HA	H/W	H/HA
holotype	5.2	5.6	7.9	1.6	0.71	3.50
paratype MNHN 1	4.9	5.7	7.4	1.5	0.77	3.80
paratype MNHN 2	4.9	5.5	7.0	1.4	0.79	3.93
paratype MNHN 3	4.9	5.7	7.1	1.7	0.80	3.35
paratype MNHN 4	5.1	5.6	7.4	1.7	0.76	3.29

Table 18. - *Calliotropis oregmene* : Shells measurements in mm for types.

Discussion. *Calliotropis oregmene* n. sp. is rather close to *C. calatha* (Dall, 1927) from western Atlantic, but this taller, rather variable species has a conical, not cyrtconoidal, shape, a subcircular aperture and a broader umbilicus; moreover, it lacks the spiral cord S1 and its P2 cord has smaller, more numerous beads. The new species may remembers *C. carinata* Jansen, 1994 (Figs 184-185) from eastern Australia, but this similar in size species lacks the spiral cord S1, having only 3 spiral cords on the last whorl instead of 4, has a

subcircular aperture, thinner basal spiral cords and its umbilicus has steep sloping walls. *C. oregmene* n. sp. may be compared to *C. abyssicola* Rehder & Ladd, 1973 from central Pacific, but this slightly taller species has a subquadrate aperture, thinner spiral cords on the whorls and more numerous (from 6 to 8) thinner spiral cords on the base. The new species remembers also weakly *Calliotropis oros marquisensis* n. ssp. (Figs 124-129), but this species from Marquesas Islands lacks a spiral cord P2,

has tertiary spiral cords between P1 and P3, more numerous spirical cords on the base and a wider umbilicus.

Etymology. Elongated (Greek : *ορεγμενος*) - with reference to the peculiar shape of the aperture.

Calliotropis cycloides n. sp.

Figs 102-105, Table 19

Type material. Holotype (5.0 x 7.1 mm) MNHN (9870). Paratypes: 3 MNHN (9871 & 9872).

Type locality. Fidji, BORDAU 1, stn DW1496, 18°43'S, 178°23'W, 392-407 m.

Material examined. Fiji. BORDAU 1: stn DW1421, 17°08'S, 178°59'W, 403-406 m, 6 dd. - Stn DW1422, 17°08'S, 178°59'W, 360-371 m, 1 dd. - Stn DW1423, 17°08'S, 178°59'W, 402-410 m, 2 dd (paratypes 9872), 2 dd sub, 2 dd juv. - Stn DW1463, 18°10'S, 178°44'W, 300-400 m, 1 dd. - Stn DW1496, 18°43'S, 178°23'W, 392-407 m, 2 dd (holotype and paratype 9871).

Loyalty ridge. MUSORSTOM 6: stn DW392, 20°47'S, 167°05'E, 340 m, 1 dd. - Stn DW446, 20°54'S, 167°19'E, 360 m, 1 dd.

New Caledonia. BATHUS 1: stn DW654, 237-298 m, 21°17'S, 165°57'E, 1 dd. - BATHUS 2: stn DW757, 22°20'S, 166°13'E, 330 m, 1 dd.

Solomon Islands. SALOMON 1: stn DW1855, 9°46.4'S, 160°52.9'E, 252-263 m, 1 dd, 2 dd juv. - Stn DW1856, 9°46.4'S, 160°52.3'E, 254-281 m, 1 dd.

Distribution. South-western Pacific (from Solomon Islands to Fiji), 371-403 m

Diagnosis. A small *Calliotropis* species with a moderately depressed, conical shape, white, with thin axial ribs on the whole surface, up to 3 nodular spiral cords on spire whorls, the abapical cord the strongest with sharp spines; one additional thin, granular, spiral

cord on last whorl; base with 3 granular spiral cords; large umbilicus with 2 spiral cords inside.

Description. *Shell* of small size for the genus (height up to 5.0 mm, width up to 7.1 mm), broader than high, rather thin, conical or slightly cyrtconoidal; spire moderately depressed, height 0.7x to 0.8x width, 4.0x to 5.0x aperture height; umbilicus rather broad.

Protoconch from 200 to 250 µm, of 1 whorl, glassy, with a very weak terminal varix.

Teleoconch up to 5.8 weakly convex whorls, bearing up to 4 spiral granular cords and prosocline ribs; nodules from cords produced by intersections with axial ribs.

Suture impressed, weakly canaliculated.

First whorl convex, sculptured by 15 slightly prosocline smooth ribs, interspace between ribs about 2x to 2.5x broader than ribs; primary spiral cords P2 and P3 appearing at first half of whorl, both weak, granular, clearly visible at end of whorl. On second whorl, P2 and P3 similar in size; axial ribs weakly stronger than on first whorl. On third whorl, beads of both P2 and P3 strongly sharp, beads of P3 horizontally oriented, the ones of P2 slightly adapically oriented; shoulder at P2 with an almost horizontal ramp; axial ribs becoming obsolete. On fourth whorl, P1 appearing, granular, beads quickly slightly sharp; nodules of P2 and P3 sharp and scaly, nodules of P3 much longer; thin crowded axial ribs on whole surface of whorl, distance between similar in size to ribs; ribs almost orthocline between suture and P1, more prosocline towards abapical part of whorl. On fifth whorl, P3 the strongest, P1 the weakest; beads of P1 scaly like those of P2 and P3; P1 making shoulder with an almost horizontal ramp. On last whorl, P4 emerging from suture, granular, slightly scaly, weaker than P1; distance between P2 and P3 bigger than other distances between cords.

Aperture subquadrate, inclined backward; outer lip thin, meeting inner lip with an obtuse, poorly marked, angle.

Figures 162-179. Scale bar = 5 mm.

162-167. *Calliotropis calcarata* (Schepman, 1908).

162-163. Syntype ZMA, Indonesia, 216 m [SIBOGA, stn 302], 4.5 x 8.3 mm; **164-165.** MNHN, Indonesia, Tanimbar Is., 285-297 m [KARUBAR, stn CP83], 5.2 x 8.3 mm; **166-167** MNHN, Solomon Islands, 194-286 m [SALOMON 1, stn DW1768], 4.4 x 7.7 mm.

168-171. *C. pulchra* (Schepman, 1908), Indonesia.

168-169. Syntype ZMA, Indonesia, 397 m [SIBOGA, stn 256], 6.5 x 13.0 mm; **169-170.** MNHN, Tanimbar Is., 285-297 m [KARUBAR, stn CP83], 7.9 x 13.3 mm.

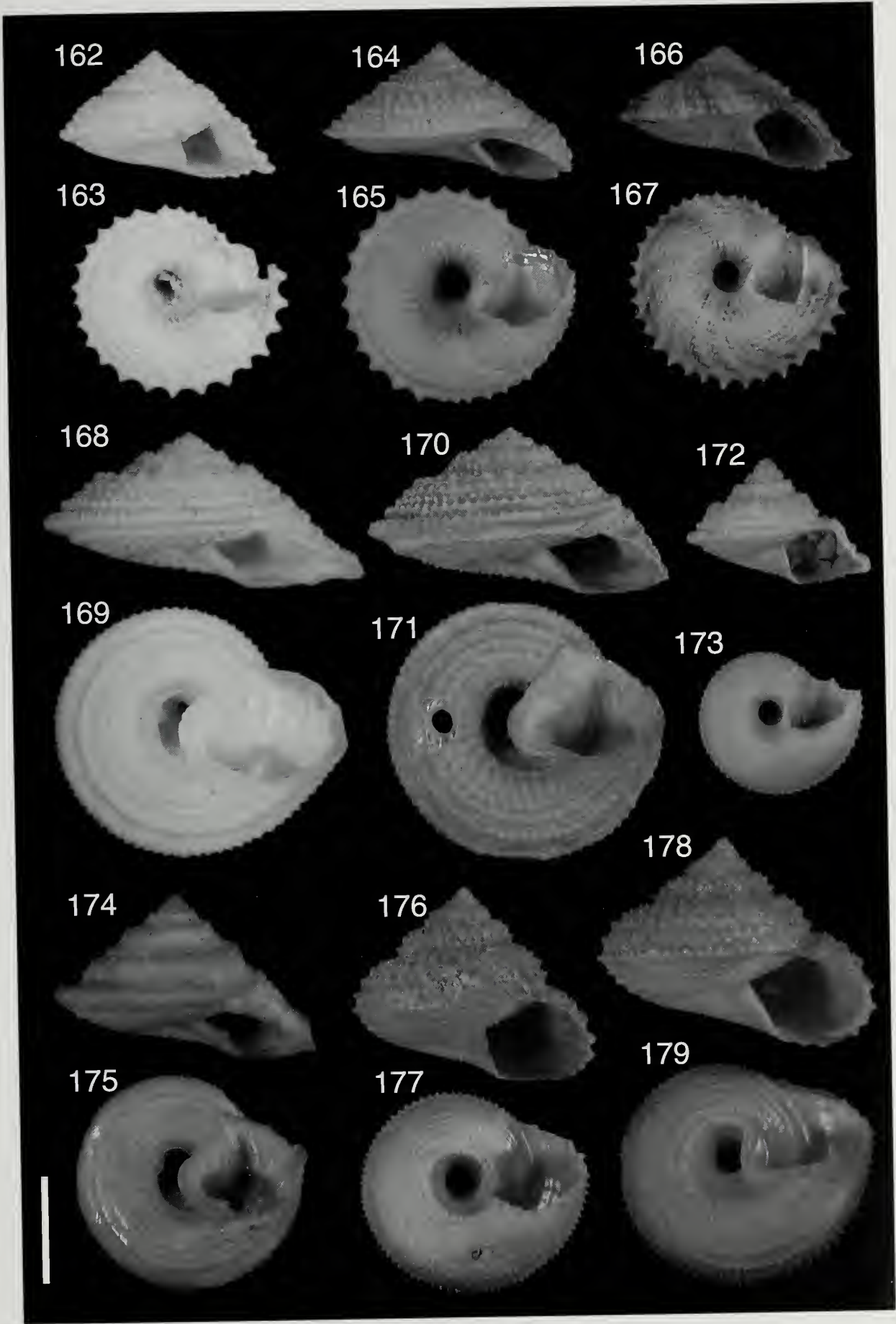
172-175. *C. limbifera* (Schepman, 1908).

172-173. MNHN, Loyalty Ridge, 300-315 m [BIOGEOCAL, stn DW253], 4.3 x 6.0 mm; **174-175.** Holotype ZMA (3.08.055), south-western Philippines, 522 m [SIBOGA, stn 95], 7.4 x 11.3 mm.

176-179. *C. pistis* n. sp., New Caledonia.

176-177. Holotype MNHN (9851), Loyalty Ridge, 780 m [MUSORSTOM 6, stn CP438], 9.3 x 11.5 mm;

178-179. MNHN, 720 m [MUSORSTOM 4: stn DC168], 10.1 x 12.9 mm.



Columella curved in the middle, sometimes slightly reflected into umbilicus, without tooth.
Base almost flat or very weakly convex, with 3 thick granular spiral cords; distance between cords similar in size to cords; axial ribs between cords, connecting beads of spiral cords.

Umbilicus rather broad, diameter ca. 20% to 25 % of shell width, deep, funnel shaped, with strong, lamellose, widely spaced, axial ribs and 2 granular spiral cords within, the innermost one scaly.
Colour of teleoconch white with pinkish dots on spines of spiral cords; protoconch white.

	TW	H	W	HA	H/W	H/HA
holotype	5.6	5.0	7.1	1.1	0.70	4.55
paratype MNHN 1496	5.7	4.4	6.3	1.1	0.70	4.00
paratype MNHN 1423/1	5.8	4.7	6.0	1.0	0.78	4.70
paratype MNHN 1423/2	5.5	4.5	6.2	0.9	0.73	5.00

Table 19. - *Calliotropis cycloides* : Shells measurements in mm for types.

Discussion. The combination of a moderately depressed spire, a spiral cord P3 with strong spiny scales, a flat base with 3 thick granular spiral cords and a broad umbilicus with 2 spiral cords within makes *Calliotropis cycloides* n. sp. hard to confuse with another *Calliotropis* species, except with *C. gemmulosa* (A.Adams, 1860) from Japan and Philippines (see Higo, Callomon & Goto, 2001, for an illustration of the MNH holotype), but this species has a cyrtonoidal shape, much more convex whorls and a broader umbilicus with only one spiral cord inside.
C. cycloides n. sp. is rather close to *C. sagarinoi* Poppe, Tagaro & Dekker, 2006 from Philippines, but this species has a less elevated spire, a cyrtconoidal shape, only 2 spiral cords on the base and no spiral cord inside the umbilicus. Specimens of the new species from Solomon Islands are more depressed as specimens from Fiji and New Caledonia, being more similar to *C. sagarinoi*, but they keep the characteristic 3 spiral cords on the base and 2 spiral cords inside the umbilicus.
The new species may remember *C. bucina* Vilvens, 2006 (Figs 106-107) from Réunion and Mayotte Islands, but this species is a bit smaller for a similar number of whorls and has more convex whorls, a cyrtconoidal shape, a spiral cord S1 always present and a spiral cord P3 that is the only one strongly spiny.

Etymology. Wheel shaped (Greek : κυκλος) - after the general shape of the shell, evoking a toothed wheel.

Calliotropis eucheloides Marshall, 1979
Figs 138-155, 160-161, Tables 20, 21

Calliotropis eucheloides Marshall, 1979: 527-528, figs. 3A-C, tab. 2. Type locality: Kermadec Islands (Raoul Is.), 29°15.5'S, 177°50'W, 366-402 m.
Other references :
Calliotropis eucheloides - Poppe, Tagaro & Dekker, 2006: 63.

Calliotropis eucheloides - Vilvens, 2006: 62, figs. 24-27.

Remarks about three related species.

Some authors (e.g. Poppe et al., 2006) have pointed out that some confusion exists between the three species *Calliotropis calcarata* (Schepman, 1908) (Figs 156-157, 162-167) from Indonesia, *C. galea* (Habe, 1953) (Figs 80-83, 158-159) from Japan and *C. eucheloides* Marshall, 1979 from Indo-Pacific. Regarding the original descriptions and material from types or certified specimens, the differences between the three species seems nevertheless rather clear ("i:Pj-Pk" below means "spiral cords Pi and Pj appear at whorl #i" and "i:Pj/2" means "spiral cord Pj divides in two cords at whorl #i") :

- ♦ *C. calcarata* has a depressed spire, with 6 even spaced spiral cords on the last whorl (1:P1-P3; 3:P2-P4; 4:S1, S2) with granules of P4 sharp, not axially elongated, at most a very weak columellar basal tooth, 7-8 granular spiral cords on the base, a wide umbilicus with 1 spiral cord inside.
- ♦ *C. galea* has also a rather depressed spire, 5 spiral cords on the last whorl (1:P1-P2; 3:P3; 4:S1;6:P1/2) with granules of P3 axially elongated (proscloine shape of ribs) and distance between adapical cords smaller than distance between abapical cords, a weak columellar basal tooth, 6 granular spiral cords on the base, a wide umbilicus with 1 spiral cord inside.
- ♦ *C. eucheloides* has a more elevated spire, 5 spiral cords on the last whorl (1:P1-P2; 3:P3, S1;5:P1/2) with granules of P3 axially elongated (proscloine shape of ribs) and distance between adapical cords smaller than distance between abapical cords, a strong (sometimes acute) columellar basal tooth, a base with 6 granular spiral cords or nearly smooth (all intermediates exist), a wide umbilicus with 1 spiral cord inside.
Poppe et al. (2006) suspected however that *C. eucheloides* could be a synonym of *C. calcarata*. They described from Philippines an additional species

related to these three (?) species : *C. virginiae* Poppe, Tagaro & Dekker, 2006, close to *C. galea* but said to be different by the shape of the spire, the whorls and the beads of the spiral cords.

Remarks on the variation of *C. eucheloides*.

On the other hand, *C. eucheloides* brings another problem, that is its high variability regarding the height of the shell and moreover the sculpture of its base. In the studied material (see list below), high variations for the basal sculpture were indeed found. Some of studied specimens (including also material from Philippines provided by malacologists-dealers as G. Poppe and F. Dedonder), show the typical characters of the species - let's talk about these specimens as belonging to the "typical form", with 6 granular basal spiral cords and a spiral cord inside the umbilicus (Figs 138-145). This is the single form that can found outside the New Caledonia area throughout the western Pacific Ocean and the Indian Ocean. But some other specimens collected in New Caledonia and Loyalty Islands area seemed however, at first look, to belong to another species, because they have

- ♦ a smooth base instead basal granular spiral cords;
- ♦ no spiral cord within the umbilicus;
- ♦ a spire slightly more elevated (ratio H/W larger).

form of shell	Frequency	H/W : mean	H/W : standard deviation
"typical"	59	0.70593964	0.07791968
"smooth"	25	0.73655792	0.04559639

To estimate if there was here a significant difference, we did an analysis of variance (General Linear Model procedure ANOVA of SAS software) :

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	0.01646169	0.01646169	3.36	0.0705
Error	82	0.40204241	0.00490296		
Corrected Total	83	0.41850410			

It is clear that there is no clear evidence of a separation between the two groups, because the probability of a invalid reject of an null hypothesis stating no significant difference is of about 7%, that is bigger than the usual significance level of 5%. But the most convincing clue for keeping a single species is certainly given by specimens belonging to

- let's talk about these specimens as belonging to the "smooth form" (Figs 152-155). A first look to the distribution of the two kinds of specimens reveal that there is no geographic separation between them : the two kind of shells were found together in 5 stations of similar depth from New Caledonia and Loyalty Islands.

Location	Depth
New Caledonia	
18°52'S, 163°23'E	502-516 m
18°56'S, 163°22'E	444-452 m
22°54'S, 167°13'E	435-447 m
22°58'S, 167°33'E	410-440 m
Loyalty Islands	
20°41'S, 167°07'E	373 m

Table 20. - *Calliotropis eucheloides* : locations of simultaneous occurrences of typical form and smooth form.

More accurate studies regarding the H/W ratio for random samples gave the following result for typical and smooth form of the species :

an "intermediate form" (Figs 146-151), with weak but visible, smooth or weakly granular spiral cords on the base, sometimes also with a weak spiral cord within the umbilicus. Such specimens occur in the same New Caledonia and Loyalty Islands area. Two of the three forms were found together in 5 stations of the same area, at similar depth.

Location	Depth	Kind of forms
New Caledonia		
18°29.8'S, 163°02.8'E	365 m	t.f. + i.f.
22°17'S, 167°12'E	390 m	t.f. + i.f.
22°47'S, 167°14'E	440-450 m	t.f. + i.f.
22°49'S, 167°12'E	390-395 m	s.f. + i.f.
23°00'S, 167°16'E	350 m	t.f. + i.f.

Table 21. - *Calliotropis eucheloides* : locations of simultaneous occurrences of intermediate form with typical form or smooth form (t.f. = typical form; i.f. = intermediate form; s.f. = smooth form).

The conclusion that only anatomical studies may prove definitively that there is here only one species or two; so, we keep provisionally all the specimens examined here under the only name given by Marshall. Such conchological variations among specimens of the same species are not really a wonder: for example, *Calliotropis calatha* (Dall, 1927) from western Atlantic is in the same way also extremely variable (Quinn, 1979: 9-13, figs 15-20).

Material examined. (t.f. = typical form; i.f. = intermediate form; s.f. = smooth form).

New Caledonia. Vauban 1978-79: stn 3, 22°17'S, 167°12'E, 390 m, 4 dd t.f. 1 dd i.f. - Stn 4, 22°17'S, 167°13'E, 400 m, 2 dd t.f. 30 lv i.f., 10 lv juv i.f. - Stn 15, 22°49'S, 167°12'E, 390-395 m, 20 lv s.f., 4 lv juv. s.f., 13 lv i.f., 2 lv juv i.f. - Stn 16, 22°46'S, 167°12'E, 390-400 m, 10 dd i.f. - Stn DW20, 22°44'S, 167°42'E, 415-470 m, 3 dd t.f. - Northern lagon: stn 475, 18°36'S, 163°11'E, 415-460 m, 1 dd t.f. - Surprise atoll, Lagon 8: stn 444, 18°15'S, 162°59'E, 300-350 m, 1 dd s.f. - BLOCAL: stn DW37, 23°00'S, 167°16'E, 350 m, 1 dd juv t.f., 2 lv i.f. - Stn DW43, 22°46'S, 167°15'E, 400 m, 1 dd t.f. - Stn DW44, 22°47'S, 167°14'E, 440-450 m, 15 dd t.f., 15 dd juv t.f., 1 dd i.f. - Stn DW77, 22°15'S 167°15'E, 440 m, 25 dd t.f. 15 juv dd t.f. - MUSORSTOM 4: stn DW156, 18°54'S, 163°19'E, 525 m, 7 dd t.f., 1 dd juv t.f. - Stn DW162, 18°35'S, 163°10'E, 525 m, 7 dd t.f., 1 dd juv t.f. - Stn CP171, 18°58'S, 163°14'E, 425 m, 2 dd t.f. - Stn CP180, 18°57'S, 163°18'E, 440 m, 4 dd t.f. - Stn DW181, 18°57'S, 163°22'E, 350 m, 60 dd s.f. - Stn DW182, 18°59'S, 163°24'E, 305 m, 2 dd s.f. - Stn CP193, 18°56'S, 163°23'E, 415 m, 5 dd s.f. - Stn CP195, 18°55'S, 163°22'E, 465 m, 1 dd s.f. - Stn DW196, 18°55'S, 163°24'E, 550 m, 5 dd t.f., 1 dd juv s.f. - Stn DW197, 18°51'S, 163°21'E, 550 m, 2 dd t.f. - Stn DW212, 22°47'S, 167°10'E, 375-380 m, 60 dd i.f. - Stn DW222, 22°58'S, 167°33'E, 410-440 m, 2 dd t.f., 1 dd s.f. - Stn DW222, 22°58'S, 167°33'E, 410-440 m, 2 dd t.f. - Stn CC247, 22°09'S, 167°13'E, 435-460 m, 3 dd t.f. - Stn CC246, 22°08'S, 167°11'E, 410-420 m, 1 dd t.f. - SMIB 3: stn DW28, 22°47'S, 167°12'E, 394 m, 16 dd i.f. - Stn DW29, 22°47'S, 167°12'E, 405 m, 60 lv i.f. - Secteur des Belep, stn 1152, 18°58'S, 163°24'E, 335 m, 40 dd s.f. - Stn 1153, 18°58'S, 163°23'E, 330 m, 4 dd s.f. - HALICAL 1: stn DW01, 18°56'S, 163°24'E, 380-400 m, 7 dd s.f. - Stn DW04, 18°55'S, 163°24'E, 350-365 m, 1 lv s.f. - SMIB 6: stn DW110, 19°05'S, 163°30'E, 225-230 m, 1 dd s.f. - Stn DW118, 18°58'S, 163°26'E, 290-300 m, 2 dd s.f. - Stn DW121, 18°58'S, 163°26'E, 315 m, 3 dd s.f. - Stn DW123, 18°57'S, 163°25'E, 330-360 m, 1 dd s.f. - SMIB 10: stn DW215, 24°56'S, 168°21'E, 508-553 m, 1 dd s.f. - SMIB 8: stn DW187, 23°17'S, 168°06'E, 390-540 m, 1 dd i.f. - Stn DW189, 23°18'S, 168°06'E, 400-402 m, 1 dd i.f. - Stn DW197-199, 22°51'S-22°52'S, 167°12'-168°12'E, 408-436 m, 70 dd i.f. - BATHUS 2: stn 4, 22°17'S, 167°13'E, 400 m, 2 dd t.f. - Stn DW719, 22°48'S, 167°16'E,

444-445 m, 2 dd s.f. - Stn DW723, 22°50'S, 167°27'E, 430-433 m, 4 dd t.f. - Stn DW729, 22°52'S, 167°12'E, 400 m, 40 dd. i.f. - Stn DW730, 23°03'S, 166°58'E, 397-400 m, 11 dd t.f., 2 dd juv t.f. - Stn DW733, 22°55'S, 166°49'E, 520 m, 6 dd t.f. - Stn DW731, 22°49'S, 166°45'E, 300-370 m, 2 dd t.f. - Stn DW758, 22°18'S, 166°11'E, 377-386 m, 1 dd and 1 dd juv. t.f. - Stn CP760, 22°19'S, 166°11'E, 455 m, 6 dd t.f. - Stn CP761, 22°19'S, 166°11'E, 490-500 m, 5 dd t.f. - HALIPRO 1: stn CP877, 23°03'S, 166°59'E, 464-480 m, 1 dd t.f. - SMIB 2: stn DW3, 22°56'S, 167°15'E, 412-428 m, 4 dd i.f. - Stn DW4, 22°53'S, 167°13'E, 410-417 m, 1 dd i.f. - Stn DW8, 22°54'S, 167°13'E, 435-447 m, 1 dd t.f., 1 dd s.f. - Stn DW16, 22°51'S, 167°12'E, 390 m, 7 dd i.f. - Stn DW21, 22°40'S, 167°41'E, 460-500 m, 2 dd t.f. - Stn DW23, 22°31'S, 167°37'E, 410-420 m, 5 dd t.f. - BATHUS 4: stn CP889, 21°01'S, 164°27'E, 416-433 m, 4 dd t.f. - Stn DW924, 18°55'S, 163°24'E, 344-360 m, 40 dd s.f. - Stn DW925, 18°55'S, 163°24'E, 370-405 m, 50 lv s.f. - Stn DW926, 18°57'S, 163°25'E, 325-330 m, 40 dd s.f. - Stn DW927, 18°56'S, 163°22'E, 444-452 m, 15 lv s.f. - Stn DW929, 18°52'S, 163°23'E, 502-516 m, 1 lv t.f. 5 dd s.f. - Stn DW927, 18°56'S, 163°22'E, 444-452 m, 1 dd t.f. 40 dd s.f. - Stn DW931, 18°55'S, 163°24'E, 360-377 m, 42 dd t.f., 3 dd juv dd s.f. - Stn DW932, 19°08'S, 163°29'E, 170-190 m, 2 dd s.f. - Stn CP939, 18°58'S, 163°25'E, 304-320 m, 9 dd s.f. - Stn DW940, 19°00'S, 163°26'E, 305 m, 40 dd s.f. - Stn DW941, 19°02'S, 163°27'E, 270 m, 1 dd s.f. - Stn DW945, 20°12'S, 164°34'E, 530-620 m, 6 dd t.f. - PALEO-SURPRISE: stn DW1391, 18°29.8'S, 163°02.8'E, 365 m, 2 dd juv t.f. 1 dd i.f. - Stn CP1392, 18°29.8'S, 163°02, 370 m, 6 dd t.f., 1 dd juv t.f. - NORFOLK 1: stn DW1716, 23°22'S, 168°03'E, 266-276 m, 1 dd i.f. - Stn DW1729, 23°20'S, 167°16'E, 340-619 m, 3 lv i.f. - Stn DW1733, 22°56'S, 167°15'E, 427-433 m, 1 dd i.f., 1 dd juv i.f. - Stn DW1736, 22°51'S, 167°12'E, 383-407 m, 60 lv i.f. - Stn DW1737, 22°52'S, 167°12'E, 343-400 m, 100 lv i.f. - Stn DW1738, 22°51'S, 167°10'E, 340-381 m, 50 lv i.f. - Stn DW1739, 22°51'S, 167°12'E, 404-448 m, 1 dd i.f. **Norfolk Ridge.** BATHUS 3: stn CP829, 23°21'S, 166°02'E, 386-390 m, 1 dd t.f. - Stn DW838, 23°01'S, 166°56'E, 400-402 m, 12 dd t.f. - Stn DW937, 23°02'S, 166°57'E, 402-412 m, 7 dd t.f. - Stn DW838, 23°01'S, 166°56'E, 400-402 m, 1 dd t.f. **Chesterfield Islands.** Coral sea. MUSORSTOM 5: stn 334, 20°06'S 158°48'E, 315-320 m, 1 dd t.f. - Stn 361, 19°53'S, 158°38'E, 400 m, 5 dd t.f. - Stn 378, 19°54'S, 158°38'E, 355 m, 1 dd t.f. - Stn 379, 19°53'S, 158°40'E, 370-400 m, 4 dd t.f., 1 dd juv t.f. - Stn 382, 19°37'S, 158°43'E, 580 m, 1 dd juv t.f. - Stn 362, 19°53'S, 158°40'E, 410 m, 1 dd t.f., 1 dd juv t.f. **Loyalty Islands.** MUSORSTOM 6: stn DW391, 20°47'S, 167°06'E, 390 m, 1 dd t.f. - Stn DC402, 20°30'S, 166°49'E, 520 m, 3 dd s.f. - Stn DW406, 20°41'S, 167°07'E, 373 m, 1 dd t.f., 1 dd juv t.f., 1 dd s.f. - Stn DW410, 20°38'S, 167°07'E, 490 m, 1 dd t.f. -

Stn DW411, 20°40'S, 167°03'E, 424 m, 1 dd t.f. - Stn DW428, 20°24'S, 166°13'E, 420 m, 1 dd t.f. - Stn DW459, 21°01'S, 167°31'E, 425 m, 2 dd t.f. - Stn CP465, 21°04'S, 167°32'E, 480 m, 1 dd t.f. - Stn DW487, 21°23'S, 167°46'E, 500 m, 1 dd t.f. - SMIB 5: stn DW91, 22°18'S, 168°41'E, 340 m, 1 dd i.f. - Stn DW87, 22°19'S, 168°41'E, 370 m, 2 dd i.f. - BIOGEOCAL: stn DW308, 20°40'S, 166°58'E, 510-590 m, 1 dd t.f., 1 dd juv t.f.

Fidji. BORDAU 1: stn DW1421, 17°08'S, 178°59'W, 403-406 m, 5 dd t.f. - Stn DW1499, 18°40'S, 178°27'W, 389-400 m, 4 dd t.f., 3 dd sub t.f. - Stn DW1496, 18°43'S, 178°23'W, 392-407 m, 7 dd, t.f. - Stn DW1499, 18°40'S, 178°27'W, 389-400 m, 2 dd, t.f.

Vanuatu. MUSORSTOM 8: stn DW978, 19°23'S, 169°27'E, 408-413 m, 20 dd t.f. - Stn DW972, 19°22'S, 169°28'E, 487-507 m, 1 dd t.f. - Stn CP980, 19°21'S, 169°25'E, 433-450 m, 3 dd t.f. - Stn DW1060, 16°14'S, 167°21'E, 375-397 m, 1 dd juv t.f. - Stn DW1065, 16°16'S, 167°21'E, 360-419 m, 1 dd t.f., 1 dd juv t.f. - Stn CP973, 19°21'S, 169°27'E, 460-480 m, 1 dd t.f. - Stn CP963, 20°20'S, 169°49'E, 400-440 m, 4 dd t.f.

Wallis Island. MUSORSTOM 7: stn DW526, 13°13'S, 176°15'W, 335-360 m, 1 dd t.f. - Stn DW523, 13°12'S, 176°16'W, 455-515 m, 1 dd t.f., 1 dd juv t.f. - Stn CP606, 13°21'S, 176°08'W, 420-430 m, 1 dd t.f. - Stn DW604, 13°21'S, 176°08'W, 415-420 m, 1 dd t.f. - Stn DW605, 13°21'S, 176°08'W, 335-340 m, 1 dd t.f. - Stn DW601, 13°19'S, 176°17'W, 350 m, 1 dd t.f., 15 dd juv t.f.

Futuna Island. MUSORSTOM 7: stn DW511, 14°14'S, 178°11'W, 400-450 m, 1 dd t.f.

Waterwitch bank. MUSORSTOM 7: stn DW569, 12°30'S, 176°51'W, 300-305 m, 1 dd t.f.

Tonga. BORDAU 2: stn DW 1548, 20°38'S, 175°03'W, 476-478 m, 1 dd t.f. - Stn DW 1577, 19°42'S, 174°19'W, 257-265 m, 1 dd t.f. - Stn DW 1628, 23°22'S, 176°18'W, 400-416 m, 1 dd t.f. - Stn DW1631, 23°23'S, 176°18'W, 407-443 m, 1 dd t.f.

Solomon Islands. SALOMON 1: stn DW1768, 8°21.4'S, 160°41.8'E, 513-564 m, 1 dd t.f. - Stn DW1769, 8°20.4'S, 160°40.6'E, 200-303 m, 9 dd, 1 dd sub t.f., 1 dd juv t.f. - Stn CP1771, 8°17.1'S, 160°38.4'E, 411-498 m, 1 dd t.f. - Stn DW1776, 8°20.7'S, 160°40.7'E, 295-381 m, 7 dd t.f. - Stn DW1795, 9°18.8'S, 160°22.9'E, 442-451 m, 2 dd t.f. - Stn DW1800, 9°21.4'S, 160°23.9'E, 357-359 m, 2 dd t.f. - Stn DW1817, 9°48.2'S, 160°54.3'E, 233-269 m, 1 dd t.f. - Stn DW1820, 9°52.3'S, 160°51.4'E, 256-329 m, 3 dd t.f. - Stn DW1824, 9°48.6'S, 160°56.0'E, 298-318 m, 1 dd t.f. - Stn DW1825, 9°50.5'S, 160°58.0'E, 340-391 m, 1 dd t.f. - Stn DW1847, 10°25.7'S, 161°50.8'E, 148-210 m, 1 dd t.f. - Stn DW1855, 9°46.4'S, 160°52.9'E, 252-263 m, 2 dd t.f., 4 dd juv t.f.

Indonesia. KARUBAR : stn DW02, 05°47'S, 132°13'E, 209-240 m, 2 dd t.f., 1 dd juv t.f. - Stn DW03, 05°48'S, 132°13'E, 278-301 m, 2 dd t.f.

Distribution. Typical form : south-western Pacific (from Solomon Islands to Tonga), alive in 502-516 m, shells in 210-580 m (range computed using also the material examined by Marshall, 1979); Philippines, 150-300 m; Indonesia, 240-278 m; western Indian Ocean, 450 m (Vilvens, 2006). - Smooth form : south-western Pacific (from New Caledonia to Loyalty Islands), alive in 365-444 m, shells in 190-550 m. - Intermediate form : south-western Pacific (from New Caledonia to Loyalty Islands), alive in 350-405 m, shells in 276-510 m.

Calliotropis nux n. sp.

Figs 238-241, Table 22

Type material. Holotype (11.0 x 14.8 mm) MNHN (9873). Paratype MNHN (9874).

Type locality. Solomon Islands, SALOMON 1, stn CP1772, 8°15.8'S, 160°40.4'E, 570-756 m.

Material examined. Solomon Islands. SALOMON 1: stn CP1772, 8°15.8'S, 160°40.4'E, 570-756 m, 2 dd (holotype and paratype). - Stn CP1839, 10°16.1'S, 161°40.3'E, 575-624 m, 1 dd.

Distribution. Solomon Islands, 575-624 m.

Diagnosis. A rather tall, moderately depressed, nut-brown *Calliotropis* species with a cyrtconoidal spire, a shoulder at first third, 4 granular spiral cords on whorls, the abapical cord the strongest; prosocline thin treads between the two abapical cords; base with about 5 granular, rather thick spiral cords; rather large umbilicus with a weak spiral cord inside.

Description. *Shell* rather large for the genus (height up to 11.0 mm, width up to 14.8 mm), broader than high, rather thin, cyrtconoidal; spire moderately depressed, height 0.7x width, 4.0x to 4.6x aperture height; rather broad umbilicus.

Protoconch of about 400 µm, of 1 whorl, dome-shaped, without terminal varix.

Teleoconch up to 6.3 convex whorls, bearing up to 4 spiral granular cords; nodules from cords produced by intersections with axial ribs; secondary thin axial ribs on abapical part of last whorls.

Suture impressed, canaliculated.

First whorl convex, sculptured by 20 almost orthocline smooth ribs, interspace between ribs 2x broader than ribs; primary spiral cords P2 and P3 appearing almost immediately, granular; P2 weaker than P3. On second whorl, P2 and P3 thicker, P2 slightly weaker than P3, making shoulder; beads of P2 bluntly sharp, beads of P3 more acute. On third whorl, P3 still slightly stronger than P2; P1 appearing at end of whorl, quickly similar in size to P2; P4 emerging from suture at end of whorl, granular, similar in strength to P2. On fourth whorl, beads of P3 strongly sharp, beads of P1 and P2 rounded; axial ribs still present, thick. On fifth

whorl, beads of P3 rounded; beads of P4 sharp and more numerous; secondary thin axial, strongly prosocline ribs in area and between P3 and P4. On last whorl, P1 and P2 weaker, shoulder at P2 still visible; P3 the weakest, almost disappearing; P4 the strongest, peripheral, with crowded sharp beads; prosocline threads belt in area above P4 still visible. Aperture subelliptic; outer lip thin, with a median angle produce by spiral P4, meeting inner lip with an obtuse, poorly marked angle.

Columella straight, slightly oblique, without basal tooth.
Base slightly convex, with 5 or 6 granular, rather thick spiral cords, innermost cord slightly stronger and bordering umbilicus; distance between cords more or less similar in size to cords; weak axial ribs between cords.
Umbilicus rather broad, diameter ca. 25% of shell width, deep, funnel shaped, with low axial ribs and with an indistinct spiral cord inside.
Colour of teleoconch and protoconch nut-brown.

	TW	H	W	HA	H/W	H/HA
holotype	6.3	11.0	14.8	2.4	0.74	4.58
paratype MNHN	5.7	7.7	11.7	1.8	0.66	4.28
sp. MNHN CP1839	5.8	8.9	12.8	2.2	0.70	4.05

Table 22. - *Calliotropis nux* : Shells measurements in mm for types and specimen.

Discussion. The peculiar combination of a rather big size, evanescent P2 and P3 and a belt of prosocline threads between P3 and P4 reduce the number of species that could be compared with the new species. *Calliotropis nux* n. sp. is close to *C. midwayensis* (Lan, 1990) (Figs 88-95) from Central Pacific and South China Sea, but this similar in size species keeps only P1 and P4 on last whorl, has no shoulder, lacks thin, prosocline threads above P4 and has thinner, smooth (instead of granular) spiral cords on the base. The new species remembers a little *C. glypta* (Watson, 1879) (Figs 204-207) from eastern Australia, but this taller species has a slightly more elevated spire, much stronger P2 and P3 without shoulder and the whole surface covered by prosocline threads (not only between P3 and P4).

Etymology. Walnut (Latin : *nux*, -cis), used as a noun in apposition - with reference to the colour of the shell.

Calliotropis limbifera (Schepman, 1908)
Figs 172-175

Solariellopsis limbifera Schepman, 1908: 54 - 55,

pl. IV, fig. 3. Type locality: South-western Philippines, 5°43.5'N, 119°40'E, 522 m.

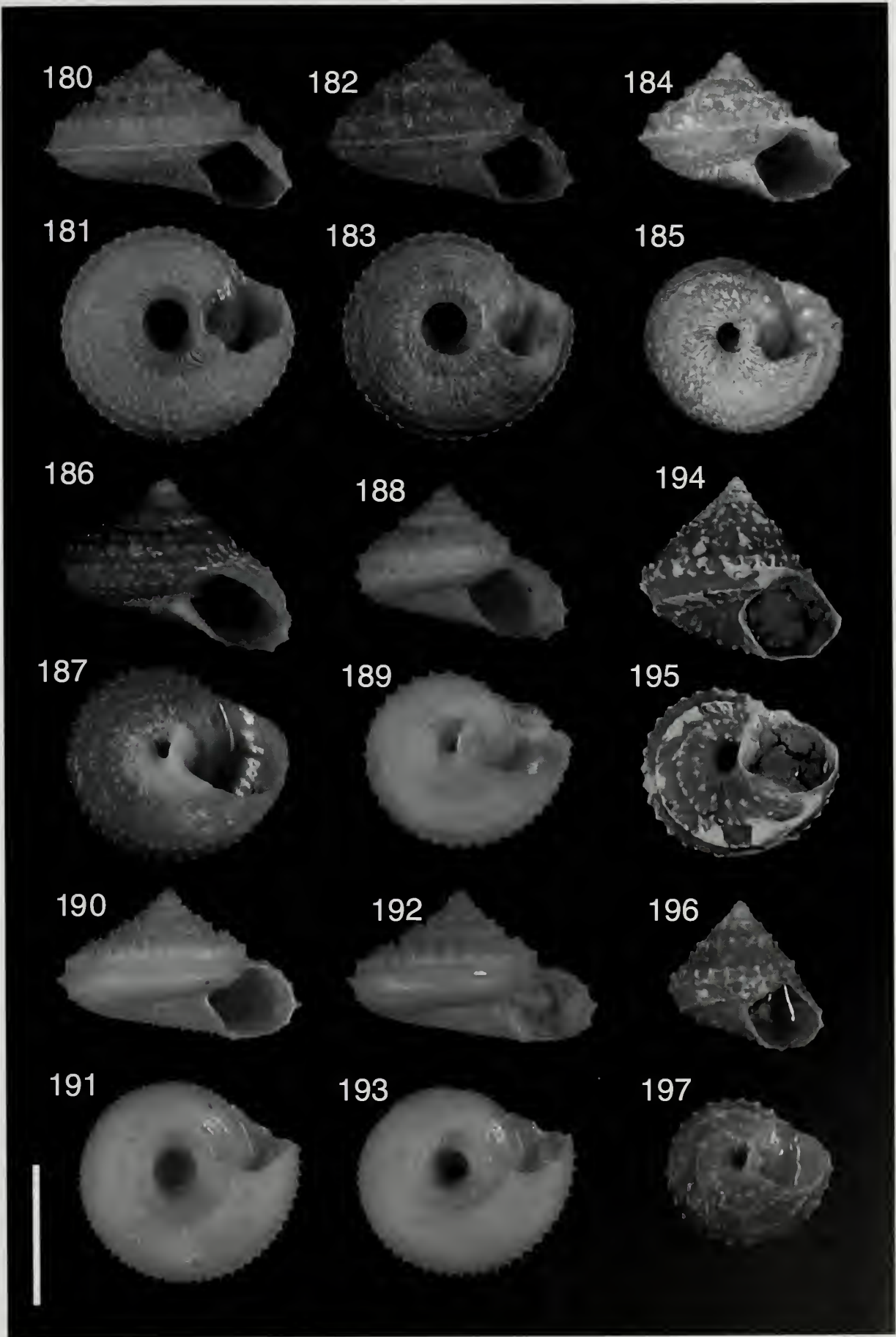
Material examined. **Loyalty Ridge.** BIOGEOCAL: stn DW253, 21°32'S, 166°29'E, 300-315 m, 1 dd. - **Wallis Island.** MUSORSTOM 7: stn DW604, 13°21'S, 176°08'W, 415-420 m, 10 lv, 3 dd sub, 6 dd juv.

Distribution. Indonesia, 522 m (Schepman, 1908); south-western Pacific, 315-415 m.

Remarks. This species was originally described from south-western Philippines (near Indonesia). One can wonder about these new records in Pacific, far from the type locality and giving so a disjoint distribution, but the specimens here examined are similar to the holotype and match the original description, except that they lack the basal columellar tooth. This could be explained by the reduced number of whorls (4.6 for the largest specimens) regarding the 5.5 whorls of the examined holotype : the Pacific specimens could be not fully adult. More material is necessary to state if this is the same species or a different one.

Figures 180-197. Scale bar = 5 mm.

- 180-183. *Calliotropis stegos* n. sp., Solomon Islands, 513-564 m [SALOMON 1, stn CP1798].
180-181. Holotype MNHN (9886), 4.7 x 7.1 mm; 182-183. Paratype MNHN (9887), 4.8 x 7.1 mm.
184-185. *C. carinata* Jansen, 1994, holotype AMS (C. 169586), New South Wales, off Sidney, 917-940 m, 4.2 x 5.9 mm - Photographs taken by M.Allen, AMS.
186-189. *C. oregmene* n. sp., Fiji, 700-707 m [BORDAU 1, stn DW1485].
186-187. Holotype MNHN (9868), 5.2 x 6.6 mm; 188-189. Paratype MNHN (9869), 4.7 x 6.5 mm.
190-193. *C. cooperculum* n. sp., Fiji, 700-707 m [BORDAU 1, stn DW1485].
190-191. Holotype MNHN (9888), 5.0 x 7.4 mm; 192-193. Paratype MNHN (9889), 4.9 x 7.2 mm.
194-197. *C. stanyii* Poppe, Tagaro & Dekker, 2006. MNHN, Solomon Is., 513-564 m [SALOMON 1, stn CP1798].
194-195. 5.9 x 6.4 mm; 196-197. 4.8 x 5.2 mm.



Calliotropis pulchra (Schepman, 1908)
Figs 168-171

Solariellopsis pulchra Schepman, 1908: 55, pl. IV, fig. 4. Type locality: Eastern Indonesia, 5°26.6'S, 132°32.5'E, 397 m.

Other reference :

Calliotropis pulchra - Vilvens, 2006: fig. 38-40.

Material examined. Indonesia. KARUBAR: stn DW07, 05°46'S, 132°21'E, 283-285 m, 9 dd, 3 dd sub, 2 dd juv. - Stn CP25, 08°30'S, 132°52'E, 336-346 m, 2 dd. - Stn DW31, 05°40'S, 132°51'E, 288-289 m, 1 dd. - Stn CP83, 09°23'S, 131°00'E, 285-297 m, 1 dd. - Stn CP84, 09°23'S, 131°09'E, 246-275 m, 4 dd, 2 dd sub.

Distribution. Indonesia, 275-397 m (range computed using also data of Schepman, 1908).

Calliotropis oros marquisensis n. ssp.
Figs 124-129, Table 23

Type material. Holotype (6.4 x 9.4 mm) MNHN (9875). Paratypes : 5 MNHN (9876), 1 C.Vilvens coll.

Type locality. Marquesas Islands, Hiva Oa Island, MUSORSTOM 9, stn DW1207, 9°51'S, 139°10'W, 500-525 m.

Material examined. Marquesas Islands. MUSORSTOM 9: stn DW1194, 9°00'S, 139°59'W, 500 m, 1 lv. - Stn DW1207, 9°51'S, 139°10'W,

500-525 m, 52 lv, 9 lv juv (with holotype and paratypes). - Stn DR1232, 9°42'S, 139°06'W, 410-413 m, 1 dd. - Stn DW1234, 9°42'S, 139°06'W, 408 m, 1 dd, 4 juv. - Stn DR1247, 10°34'S, 138°42'W, 1150-1250 m, 1 dd. - Stn DW1270, 7°56'S, 140°43'W, 497-508 m, 4 dd. - Stn DW1272, 7°55'S, 140°44'W, 660-680 m, 2 lv. - Stn DW1281, 7°48'S, 140°21'W, 400-455 m, 2 dd, 8 sub, 2 juv. - Stn DW1301, 8°57'S, 140°15'W, 489-497 m, 3 dd.

Distribution. Marquesas Islands, alive in 500-660, shells in 408-1150 m.

Diagnosis. A small *Calliotropis* species with a moderately elevated, slightly cyrtconoidal spire, white or brownish white, with 2 main granular spiral cords on spire whorls, the adapical cord close to suture and the other at third quarter of the height of whorl; additional weaker, granular spiral cords between the two main cords and an additional, peripheral, granular spiral cord on last whorl; base with 7 granular spiral cords; broad umbilicus usually without spiral cord inside.

Description. Same features as *Calliotropis oros oros* n. sp., differing from it by a slightly larger size comparing to the number of whorls (height up to 7.0 mm, width up to 10.0 mm, teleoconch up to 5.6 convex whorls), a more depressed spire (height 0.6x to 0.7x width) and a lesser number of slightly thicker beads for P3 and P4 on fourth whorl.

	TW	H	W	HA	H/W	H/HA
holotype	5,4	6,4	9,4	1,8	0,68	3,56
paratype MNHN 1	5,3	5,8	9,0	1,9	0,64	3,05
paratype MNHN 2	5,2	6,2	9,3	1,6	0,67	3,88
paratype MNHN 3	5,6	6,8	9,8	1,9	0,69	3,58
paratype MNHN 4	5,6	7,0	10,0	1,8	0,70	3,89
paratype MNHN 5	5,3	6,2	9,4	1,9	0,66	3,26
paratype MNHN CV	5,6	6,3	9,3	1,7	0,68	3,71

Table 23. - *Calliotropis oros marquisensis* : Shells measurements in mm for types.

Discussion. *Calliotropis oros marquisensis* n. ssp. seems to have constant features that distinct it from *C. oros oros* n. sp. (Figs 120-123). Because no intermediate forms were found, especially in the area between Fiji Islands and Marquesas Islands, we consider provisionnally that these two subspecies are different, although further studies on additional material could show that there is only one variable species.

Etymology. From the Marquesas Islands (Latin) - with reference to the Marquesas Is. ("Marquises" in

French) that are the characteristic area of the subspecies.

Calliotropis keras n. sp.
Figs 212-213, Table 24

Type material. Holotype (10.5 x 17.3 mm) MNHN (9877). Paratype MNHN (9878).

Type locality. Fiji, Bligh Water, MUSORSTOM 10, stn CP1344, 16°45.3'S, 177°40.5'E, 588-610 m.

Material examined. **Fiji.** MUSORSTOM 10: stn CP1344, 16°45.3'S, 177°40.5'E, 588-610 m, 2 dd (holotype and paratype), 1 dd juv. - BORDAU 1: stn CP1420, 17°05'S, 178°57'W, 550-687 m, 1 dd. - **South-western Pacific.** MUSORSTOM 7: stn CP631, 11°54'S, 179°32'W, 600 m, 1 dd. - **Tonga.** BORDAU 2: stn DW 1553, 20°42'S, 174°54'W, 650-676 m, 1 dd.

Distribution. South-western Pacific (from Fiji to Tonga), 600-650 m.

Diagnosis. A rather big white *Calliotropis* species with a rather depressed, slightly cyrtconoidal spire and an angular periphery, 2 granular spiral cords on first spire whorls and 5 granular spiral cords on last whorls; size of beads of cords decreasing in size from adapical part to abapical part; thin, crowded, strongly prosocline threads between cords; base more or less flat with 5 flat spiral cords; broad umbilicus with one thin spiral cord inside.

Description. *Shell* of rather big size for the genus (height up to 13.6 mm, width up to 19.2 mm), much broader than high, rather thin, slightly cyrtconoidal; spire moderately depressed, height 0.6x to 0.7x width, 2.1x to 3.2x aperture height; broad umbilicus. *Protoconch* damaged or strongly encrusted in all available specimens, estimated of about 350 µm. *Teleoconch* up to 6.7 convex whorls, bearing 5 spiral granular cords different in size; nodules from cords produced on first whorls by intersections with axial ribs; axial sculpture on last whorls consisting in thin, crowed, strongly prosocline threads in area between spiral cords. Suture visible, canaliculated. First whorl convex, sculptured by about 15 slightly prosocline smooth, ribs; interspace between ribs from 1.5x to 2x broader than ribs; primary cord P3

appearing almost immediately; P2 appearing at mid whorl, weaker than P3. On second whorl, P2 and P3 stronger, beads of cords somewhat sharp. On third whorl, P1 appearing, quickly as strong as other cords; P2 closer to P1 than to P3; interspace between ribs from 2x to 2.5x broader than ribs; beads of cords similar in size. On fourth whorl, P1 dividing into two similar cords; beads of P3 slightly more numerous than those of other cords; P4 emerging partially from suture, beads much more smaller and more numerous than those of P3; primary axial sculpture becoming obsolete, crowded prosocline threads appearing in whole area between P3 and P4, some similar threads appearing between P2 and P3. On last whorls, P4 peripheral: beads of spiral cords decreasing in strength and size from adapical to abapical cord, crowded beads of P4 about 2x more numerous and smaller than those of P1; thin, prosocline threads present on the whole surface between all cords. Aperture subelliptic, horizontally elongated; outer lip thin, meeting inner lip with an obtuse, poorly marked angle. Columella more or less straight, oblique, without tooth. Base almost flat, with 5 granular spiral cords, outermost cord the strongest, innermost cord stronger than other inner cords, bordering umbilicus; intermediate cords sometimes very obsolete; distance between cords decreasing from 2x size of cords for outer cords to 1x for inner cords; axial ribs between spiral cords very weak, giving to interspaces a smooth appearance. Umbilicus very wide, diameter ca. 35% of shell width, deep, funnel shaped, with steep sloping walls and one weak, subgranular spiral cord within. *Colour* of teleoconch and protoconch light brown.

	TW	H	W	HA	H/W	H/HA
holotype	5.9	10.5	17.3	3.3	0.61	3.18
paratype MNHN	5.7	9.1	14.8	4.3	0.61	2.12
specimen CP1420	6.7	13.6	19.2	4.6	0.71	2.96

Table 24. - *Calliotropis keras* : Shells measurements in mm for types and some specimen.

Discussion. Considering thin, crowded axial threads on the whorls, *Calliotropis keras* n. sp. remembers *C. glypta* (Watson, 1879) (Figs 204-207) from Australia, but this species has a more elevated spire, a spiral cord P2 much more weaker than the other cords and more numerous spiral cords on the base. The new species is also rather close to *C. derbiosa* Vilvens, 2004 (Figs 74-75) from Vanuatu and Fiji, but this bigger species has a much higher spire, stronger spiral cords on the base and no spiral cord inside the umbilicus. *Calliotropis keras* n. sp. may be compared to *C. abyssicola* Rehder & Ladd, 1973 from central Pacific,

but this species is not so depressed, has a more rounded periphery, more numerous, more concentrated spiral cords on the base towards the umbilicus and has no spiral cord inside the umbilicus. **Remarks.** The specimen from Tonga has on last whorl an additional tertiary spiral cord between the divided in two parts P1 and P2.

Etymology. Horn (Greek : κερας), used as a noun in apposition - with reference to the conical shape of spire and and the funnel shaped umbilicus.

Calliotropis elephas n. sp.

Figs 242-245, Table 25

Type material. Holotype (7.4 x 12.1 mm) MNHN (9879). Paratypes : 30 MNHN (9880), 2 NMNZ (M.273553), 2 MZB (Gst. 13.639), 2 RMBR (ZRC.MOL.2770-2771), 2 C.Vilvens coll.

Type locality. BIOCAL, stn DW51, 23°05'S, 167°45'E, 680-700 m.

Material examined. New Caledonia. BIOCAL: stn CP23, 22°46'S, 166°20'E, 2040 m, 1 dd juv. - Stn DW33, 23°10'S, 167°10'E, 675-680 m, 2 dd sub. - Stn DW36, 23°09'S, 167°11'E, 650-680 m, 2 dd, 2 dd sub, 2 dd juv. - Stn stn CP40, 22°55'S, 167°24'E, 650 m, 1 dd, 1 dd juv. - Stn DW48, 23°00'S, 167°29'E, 775 m, 15 dd, 20 dd sub. - Stn DW51, 23°05'S, 167°45'E, 680-700 m, 60 lv (with holotype and paratypes), 9 lv sub, 20 dd juv. - Stn CP52, 23°06'S, 167°47'E, 540-600 m, 1 dd. - Stn KG85, 20°59'S, 167°00'E, 1639 m, 1 dd juv. - SMIB 3: stn DW24, 22°47'S, 167°12'E, 405 m, 1 dd. - SMIB 8: DW193-196, 22°52'S-23°S, 167°20'-168°22'E, 491-558 m, 1 dd. - Stn DW201, 23°59'S, 168°21'E, 500-504 m, 1 dd. - BATHUS 2: stn DW721, 22°54'S, 167°17'E, 525-547 m, 2 dd.

Distribution. New Caledonia, alive in 680-700 m, shells in 405-2040 m.

Diagnosis. A rather small, depressed, ivory white *Calliotropis* species with a slightly cyrtconoidal spire, last whorls with shoulder under the suture, 2 granular, sharp spiral cords on spire whorls and 3 spiral cords on last whorl, adapical cord the strongest; base with 5 spiral cords, the 3 outermost always smooth; broad umbilicus without cord inside.

Description. *Shell* of moderate size for the genus (height up to 8.3 mm, width up to 13.7 mm), much broader than high, rather thin, slightly cyrtconoidal;

spire depressed, height from 0.6x to 0.7 width, 2.8x to 3.8x aperture height; broad umbilicus.

Protoconch of about 350 µm, of 1 whorl, glassy, dome shaped, without terminal varix.

Teleoconch up to 5.8 convex whorls with up to 2 granular spiral cords; nodules from cords produced by intersections with axial ribs on first whorls; axial sculpture visible on all whorls.

Suture visible, not canaliculated.

First whorl convex, sculptured by about 18 orthocline, rather thick, smooth ribs; interspace between ribs similar in size to ribs in first half of whorl, about 2x broader than ribs after mid whorl; primary cord P2 appearing almost immediately, quickly strong, with sharp beads. On second whorl, beads of P2 stronger and sharper; axial ribs thicker; interspace between ribs still 2x broader than ribs. On third whorl, P1 appearing after mid whorl, quickly almost as strong as P2; P3 emerging partially from suture with small beads; axial ribs weakly prosocline; axial ribs connecting beads of cords P1 and P2. On fourth whorl, P1 stronger than P2, both with sharp nodules well spaced; P1 making shoulder; beads of P1 vertically oriented; axial sculpture more prosocline. On last whorl, P1 the strongest, P3 the weakest, peripheral; beads of P2 more numerous than those of P1 (ratio of 3 beads of P2 for 2 beads of P1), beads of P3 more numerous than those of P2 (ratio of 5 beads of P3 for 2 beads of P2); axial ribs becoming obsolete; P1 may exceptionally split into two cords (see specimen SMIB 8: stn DW201).

Aperture subelliptic, slightly inclined backward; outer lip thin, meeting inner lip with an obtuse, poorly marked angle.

Columella more or less straight, oblique, without tooth.

Base moderately convex, with 5 spiral cords; 3 outermost cords smooth, innermost cord granular, bordering umbilicus; intermediate cord smooth or subgranular; distance between cords from 1x to 1.5 size of cords; no axial threads between cords (only very thin growth lines).

Figures 198-213. Scale bar = 5 mm.

198-201. *Calliotropis blacki* Marshall, 1979.

198-199. Holotype NMNZ (M226932), Raoul Island, Kermadec group, 11.3 x 13.0 mm; **200-201.** MNHN, New Caledonia, 720 m [MUSORSTOM 4: stn DC168], 11.3 x 13.1 mm.

202-203. *C. dicrous* n. sp., holotype MNHN (9853), Solomon Islands, 435-461 m [SALOMON 1, stn CP1858], 10.2 x 12.9 mm.

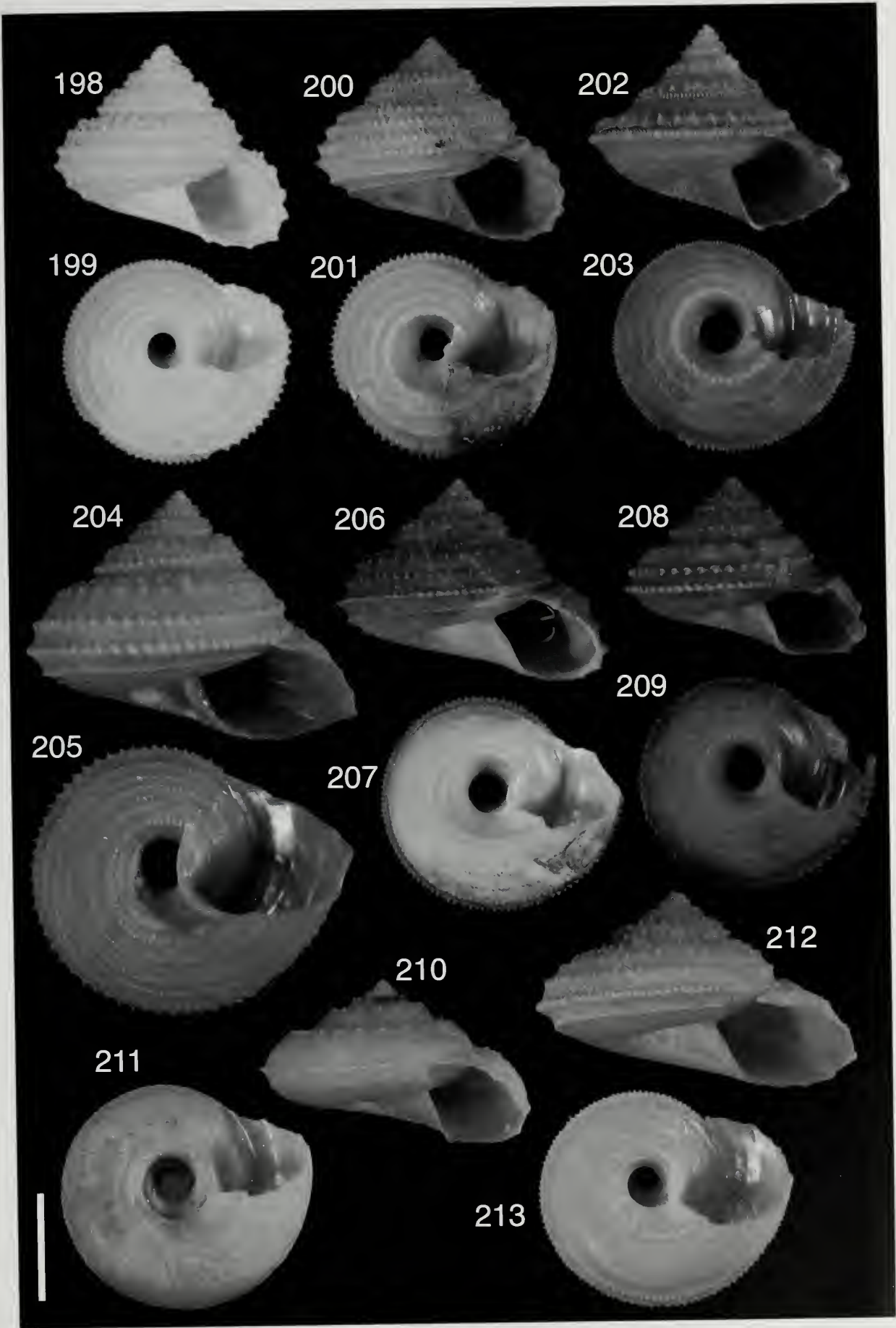
204-207. *C. glypta* (Watson, 1879).

204-205. Australia, New South Wales, 440 m, C.Vilvens coll, 18 x 21.5 mm; **206-207.** Vanuatu, 778-811 m [MUSORSTOM 8: stn DW1128], 12.0 x 16.1 mm.

208-209. *C. boucheti* Poppe, Tagaro & Dekker, 2006, MNHN, Taiwan, South China Sea, 554 m [TAIWAN 2000: stn DW46], 9.6 x 13.2 mm.

210-211. *C. rostrum* n. sp., holotype MNHN (9881), New Caledonia, 650-658 m [BATHUS 3, stn CP831], 8.3 x 13.9 mm.

212-213. *C. keras* n. sp., holotype MNHN (9877), Fiji, 588-610 m [MUSORSTOM 10, stn CP1344], 10.5 x 17.3 mm.



Umbilicus wide, diameter ca. 35% of shell width, deep, funnel shaped, with gently sloping walls, without spiral cord inside. *Colour* of teleoconch ivory white; protoconch translucent.

	TW	H	W	HA	H/W	H/HA
holotype	5.6	7.4	12.1	2.6	0.61	2.85
paratype MNHN 1	5.5	7.7	11.4	2.8	0.68	2.75
paratype MNHN 2	5.6	7.6	11.5	2.5	0.66	3.04
paratype MNHN 3	5.6	7.3	12.3	2.4	0.59	3.04
paratype MNHN 4	5.6	8.1	12.5	2.7	0.65	3.00
paratype MNHN 5	5.6	8.2	13.7	2.6	0.60	3.15
paratype MNHN 6	5.4	7.1	12.6	2.5	0.56	2.84
paratype MNHN 7	5.8	8.3	12.6	2.2	0.66	3.77
paratype MNHN 8	5.4	7.5	12.0	2.2	0.63	3.41

Table 25. - *Calliotropis elephas* : Shells measurements in mm for some types.

Discussion. *C. elephas* n. sp. is close to *C. concavospira* (Schepman, 1908) (Figs 246-247) from Indonesia, but this slightly smaller species has thinner spiral cords on the whorls with beads of P3 smaller and much more spaced, a rounded, not elongated, aperture, and thinner spiral cords on the base, all granular with thin axial threads between cords.

The new species is also rather close to *C. gemmulosa* (A.Adams, 1860) from Japan and Philippines, but this smaller species has a more elevated spire, 4 (not 3) spiral cords on the last whorl and 3 spiral cords on the base, all granular.

Regarding the number of cords, *C. elephas* n. sp. remembers *C. carinata* Jansen, 1994 (Figs 184-185) from eastern Australia, but this species has a more elevated spire, beads of P3 much more spaced, thinner, all granular spiral cords on the base with well spaced beads and numerous axial threads between cords.

The new species may be compared to *C. basileus* Vilvens, 2004 (Figs 76-79) from Fiji and New Caledonia, but this larger species has a more elevated spire, beads of P3 much more spaced and 4 (not 5) spiral cords on the base with a granular (not smooth) external cord.

Etymology. Ivory (Greek : ελεφας), used as a noun in apposition - with reference to the ivory whire colour of the shell.

Calliotropis rostrum n. sp.
Figs 210-211, Table 26

Type material. Holotype (8.3 x 13.9 mm) MNHN (9881). Paratypes : 2 MNHN (9882 & 9883).

Type locality. New Caledonia, BATHUS 3, stn CP831, 23°04'S, 166°56'E, 650-658 m.

Material examined. New Caledonia. BATHUS 3: stn DW809, 23°39'S, 167°59'E, 650-730 m, 1 dd (paratype 9883). - Stn CP831, 23°04'S, 166°56'E, 650-658 m, 2 dd (holotype and paratype 9882).

Coral Sea. MUSORSTOM 5: stn 313, 22°24'S 159°33'E, 780-930 m, 1 dd.

Distribution. South-western Pacific (New Caledonia and Coral Sea), 658-780 m.

Diagnosis. A whitish beige *Calliotropis* species of rather big size, with a cyrtoconoidal, moderately depressed spire, an rounded periphery and 2 granular spiral cords on whorls, the adapical one strong and the abapical one much more weaker, making keel, only visible on last whorls; base with 4 very weak spiral cords that are all poorly visible except the outermost and the innermost; very broad umbilicus without spiral cord inside.

Description. *Shell* of rather big size for the genus (height up to 8.7, width up to 16.2 mm), broader than high, thin, cyrtoconoidal; spire moderately depressed, height 0.5x to 0.6x width, 2.8x to 3.0x aperture height; very broad umbilicus.

Protoconch of about 270 µm, of 1 whorl, without terminal varix.

Teleoconch up to 6.1 convex whorls, bearing to 2 spiral granular cords different in size; nodules from cords produced by intersections with axial ribs; axial sculpture on first whorls, reduced to adapical part on last whorls.

Suture impressed, not canaliculated.

First whorl convex, sculptured by about 15 prosocline smooth ribs; interspace between ribs from 1.5x to 2x broader than ribs; primary cord P1 appearing immediately, granular. On second whorl, P1 stronger with sharp beads; interspace between ribs 2x broader than ribs. On third whorl, beads pointed, isolated,

almost vertically oriented; P2 and P3 absent; P4 emerging weakly from suture at end of whorl or at begin of next whorl, granular, much weaker than P1; axial ribs becoming weaker. On next whorls, P1 with strong, well spaced nodules; beads of P4 from 3x to 4x more numerous than beads of P1; axial sculpture still visible in adapical part, near beads of P1. On last whorl, P4 peripheral, making keel; weak tertiary spiral cord in the middle of area between P1 and P4 on specimen from Coral Sea.
Aperture subcircular to subelliptic; outer lip very thin, without angle and meeting inner lip with a marked angle of about 120°.

Columella more or less straight, oblique, without tooth.
Base moderately convex, with 4 spiral cords, outermost cord always distinct but weaker than innermost cord bordering umbilicus; other cords undistinct; distance between cords from 3x to 4x size of cords; no axial ribs visible between spiral cords. Umbilicus very wide, diameter measuring ca. 35% to 40% of shell width, deep, funnel shaped, with crowded, thin axial ribs and without spiral cord inside. *Colour* of teleoconch beige; protoconch off white.

	TW	H	W	HA	H/W	H/HA
holotype	6.1	8.3	13.9	2.8	0.60	2.96
paratype MNHN CP831	5.5	6.7	11.6	2.3	0.58	2.91
paratype MNHN DW809	5.9	8.7	16.2	3.1	0.54	2.81

Table 26. - *Calliotropis rostrum* : Shells measurements in mm for types.

Discussion. The combination of a depressed spire and a large smooth area between P1 and P4 avoids any confusion with any known *Calliotropis* species. The closer one could be *C. bicarinata* (Schepman, 1908) (Figs 218-219) from Indonesia but this smaller species has a more elevated spire, a thick, scaly spiral cord P3, a spiral cord P4 thicker than the one of the new species and 3 thick spiral cords on the base.

Etymology. Ram of an ancient warship (Latin), used as a noun in apposition - with reference to the shape of the last whorl with a prominent peripheral spiral cord.

Calliotropis nomisma n. sp.
Figs 236-237, Table 27

Type material. Holotype (9.7 x 17.6 mm) MNHN (9884). Paratypes : 7 MNHN (9885), 2 MZB (Gst. 13.640), 2 RMBR (ZRC.MOL.2772-2773), 1 C.Vilvens coll.

Type locality. Indonesia, KARUBAR, stn CP69, 08°42'S, 131°53'E, 356-368 m.

Material examined. Indonesia. KARUBAR: stn CP59, 08°20'S, 132°11'E, 399-405 m, 1 dd. - Stn CP69, 08°42'S, 131°53'E, 356-368 m, 16 dd (with holotype and paratypes).

Distribution. Indonesia, 368-399 m.

Diagnosis. A pearly grey *Calliotropis* species of medium size, with a slightly cyrtoconoidal, depressed spire, an angulated periphery and up to 3 granular spiral cords on whorls, the intermediate cord disappearing on last whorls while the abapical cord grows; abapical cord making a strong keel on last

whorl; base smooth except 1 (or sometimes 2) granular spiral cord around umbilicus; one basal columellar tooth; broad umbilicus without spiral cord inside.

Description. *Shell* of medium size for the genus (height up to 10.2 mm, width up to 18.1mm), much broader than high, slightly cyrtoconoidal; spire depressed, height from 0.5x to 0.6x width, 3.5x to 3.8x aperture height; broad umbilicus.

Protoconch of about 350 µm, of 1 whorl, without terminal varix.

Teleoconch up to 6.3 moderately convex whorls, bearing 2 spiral granular cords different in size on first whorls, 3 cords on intermediate whorls and 2 cords on last whorls; primary axial sculpture only visible on first whorls.

Suture impressed, canaliculated.

First whorl convex, sculptured by about 15 orthocline smooth ribs; interspace between ribs from 1.5x to quickly 2.5x broader than ribs; primary cords P1 and P3 appearing almost immediately, granular; nodules from cords produced by intersections with axial ribs; P3 slightly stronger than P1. On second whorl, beads of both cords stronger, beads of P3 sharper than those of P1; axial ribs slightly prosocline, broader but lower. On third whorl, P4 emerging partially from suture at end of whorl, granular; beads of P4 smaller and more numerous than nodules of P3; P2 absent; axial ribs vanishing. On fourth whorl, P3 weakening and P4 fully emerging from suture, becoming stronger than P3; bead of P4 smaller than those of P1, bluntly sharp, scaly. On next whorls, beads of P1 thick, sharp, almost vertically oriented; bead of P4 2x to 3x more numerous than those of P1; P3 disappearing. On last whorl, P4 peripheral, making keel; beads of P4 crowded, vertically elongated.

Aperture subquadrangular; outer lip thin, with an median angle corresponding to exterior P4 and meeting inner lip with an angle of about 120°. Columella curved at first third, oblique, with 1 basal tooth, expanding into umbilicus. Base moderately convex, smooth except 1 granular spiral cord around umbilicus; on some specimens, an

additional thin spiral cord bordering main cord. Umbilicus wide, diameter ca. 35% of shell width, deep, funnel shaped, with steep sloping walls, undistinct crowded thin axial ribs and without spiral cord inside. Colour of teleoconch and protoconch pearly grey.

	TW	H	W	HA	H/W	H/HA
holotype	6.3	9.7	17.6	2.8	0.55	3.46
paratype MNHN 1	6.2	10.1	17.8	2.7	0.57	3.74
paratype MNHN 2	5.8	9.1	17.7	2.4	0.51	3.79
paratype MNHN 3	6.0	10.2	18.0	2.7	0.57	3.78
paratype MNHN 4	6.2	9.7	18.1	2.7	0.54	3.59

Table 27. - *Calliotropis nomisma* : Shells measurements in mm for largest types.

Discussion. Regarding the peculiar ontogeny of cords (especially of P3), the new species remembers only *Calliotropis midwayensis* (Lan, 1990) (Figs 88-95) from Midway Islands and Taiwan, but this species has a more elevated spire, more convex whorls and 6 or 7 thin spiral cords on the base. Regarding the general shape of the shell, *C. nomisma* n. sp. is rather close to *Basilissa sibogae* Schepman, 1908 from Indonesia, but this species is smaller for a similar number of whorls, has a much more elevated spire and a numerous spiral cords on the whole base.

Etymology. Medal (Greek : νομισμα), used as a noun in apposition - with reference to the depressed shape of the shell.

Calliotropis bucina Vilvens, 2006
Figs 106-107

Calliotropis bucina Vilvens, 2006: 62-66, figs. 30-35. Type locality: Reunion Island, 20°51'S, 55°36'E, 280-340 m.

Material examined. Solomon Islands. SALOMON 1: DW1768, 8°21.4'S, 160°41.8'E, 513-564 m, 21 dd. - Stn DW1820, 9°52.3'S, 160°51.4'E, 256-329 m, 1 dd. - Stn DW1834, 10°12.2'S, 161°17.8'E, 225-281 m, 4 dd.

Indonesia. KARUBAR: stn DW31, 05°40'S, 132°51'E, 288-289 m, 1 dd.

Distribution. Réunion Island, 270-310 m; Mayotte Island, 300-350 m (Vilvens, 2006); Solomon Islands, 281-513 m; Indonesia, 295-417 m.

Remarks. This species was originally described from south-western Indian Ocean. One can wonder about these new records in Pacific, in two different areas, very far from the type locality and giving thus a disjoint distribution in three segments. Nevertheless, the specimens here examined are similar to the types

and match the original description, except that they seem a little more depressed and that S2 appears a bit later. *C. bucina* Vilvens, 2006 is rather close to *C. sagarinoi* Poppe, Tagaro & Dekker, 2006 from Philippines, but this species has a less depressed spire, lacks the spiral cord S2, has only 2 (instead of 3) spiral cords on the base and has no spiral cord inside the umbilicus.

Calliotropis stegos n. sp.
Figs 180-183, Table 28

Type material. Holotype (4.7 x 7.1 mm) MNHN (9886). Paratypes : 8 MNHN (9887), 2 NMNZ (M.273554), 1 C.Vilvens coll.

Type locality. Solomon Islands, SALOMON 1, stn CP1798, 9°21.0'S, 160°29.2'E, 513-564 m.

Material examined. Solomon Islands. SALOMON 1: stn CP1749, 9°20.9'S, 159°56.2'E, 582-594 m, 3 dd, 1 dd juv. - Stn CP1750, 9°15.6'S, 159°54.6'E, 693-696 m, 1 dd, 1 dd juv. - Stn CP1751, 9°10.4'S, 159°53'E, 749-799 m, 1 dd. - Stn DW1793, 9°13.4'S, 160°07.8'E, 505-510 m, 1 dd. - Stn DW1795, 9°18.8'S, 160°22.9'E, 442-451 m, 1 dd. - Stn CP1796, 9°19.2'S, 160°25.4'E, 469-481 m, 2 dd. - Stn CP1798, 9°21.0'S, 160°29.2'E, 513-564 m, 10 lv (holotype and paratypes). - Stn CP1805, 9°35.0'S, 160°42.7'E, 367-500 m, 1 dd. - Stn CP1806, 9°37.0'S, 160°49.7'E, 621-708 m, 1 dd. - Stn CP1808, 9°45.5'S, 160°52.5'E, 611-636 m, 15 dd, 5 dd juv. - Stn CP1858, 9°37.0'S, 160°41.7'E, 435-461 m, 1 dd, 1 dd juv.

Distribution. Solomon Islands, alive in 513-564 m, shells in 451-749 m.

Diagnosis. A rather small *Calliotropis* species with a rather depressed, cyrtoconoidal spire, rather broad protoconch and weakly convex whorls, light brownish, with 2 main granular spiral cords on spire

whorls and 3 granular spiral cords on last whorl, the abapical cord peripheral; base with 5 to 7 granular spiral cords; broad umbilicus without spiral cord inside.

Description. *Shell* of moderate size for the genus (height up to 5.0 mm, width up to 7.3 mm), broader than high, rather thin, cyrtokonoidal; spire moderately elevated, height 0.5x to 0.7x width, 3.9x to 4.3x aperture height; broad umbilicus.

Protoconch from 350 to 360 µm, of about 1 whorl, dome shaped, without clearly visible terminal varix.

Teleoconch up to 4.9 convex whorls, bearing 2 spiral granular cords on spire, 3 on last whorl; nodules from cords produced by intersections with axial ribs; axial sculpture visible on first whorls, obsolete on last whorls.

Suture impressed, canaliculated.

First whorl convex, sculptured by 14 to 15 orthocline, smooth, rather thick ribs; interspace between ribs 2x to 2.5x broader than ribs; primary spiral cords P1 and P2 appearing almost immediately, similar in size. On second whorl, P2 weakly stronger than P1. On third whorl, P2 moving towards middle of whorl, much

stronger than P1; beads of both cords sharp; axial ribs weak. On last whorls, P1 and P2 similar in strength, with sharp, spaced beads; P2 median; axial ribs obsolete except near beads of cords. On last whorl, P3 visible, peripheral, with beads weaker, slightly more numerous and more closely packed than those of P1 and P2.

Aperture subquadrate; outer lip thin, meeting inner lip with an obtuse, marked angle.

Columella more or less straight, oblique, without tooth.

Base convex, with 5 to 7 granular spiral cords, of various size but with innermost cord slightly stronger, bordering umbilicus; distance between successive cords similar in size of stronger cord; axial ribs between spiral cords, connecting beads of all cords.

Umbilicus broad, diameter ca. 30% of shell width, deep, funnel shaped, with gently sloping walls, with strong axial ribs, without spiral cord inside except for very large specimens where a very thin spiral cord may be present (e.g. SALOMON 1, stn CP1749).

Colour of teleoconch light brown; protoconch glassy white.

	TW	H	W	HA	H/W	H/HA
holotype	4.8	4.7	7.1	1.1	0.66	4.27
paratype MNHN 1	4.9	4.8	7.1	1.3	0.68	3.69
paratype MNHN 2	4.8	5.0	7.3	1.3	0.68	3.85
paratype MNHN 3	4.5	4.1	6.3	1.1	0.65	3.73
paratype MNHN 4	4.6	4.7	6.9	1.2	0.68	3.92
paratype MNHN 5	4.6	4.3	6.1	1.2	0.70	3.58
paratype MNHN 6	4.4	3.8	7.0	1.3	0.54	2.92
paratype NMNZ 1	4.6	4.5	6.7	1.3	0.67	3.46
paratype NMNZ 2	4.4	3.7	5.9	1.2	0.63	3.08
paratype MNHN CV	4.7	4.3	6.6	1.3	0.65	3.31

Table 28. - *Calliotropis stegos* : Shells measurements in mm for types.

Discussion. *Calliotropis stegos* n. sp. is rather close to *C. hysterea* n. sp. (Figs 134-137) from New Caledonia, but the latter has an almost conical shape, beads of P2 thicker and more spaced, a bigger protoconch and a secondary cord S1.

The new species is superficially similar to *C. scalaris* Lee & Wu, 2001 (Figs 116-119) from South China Sea and Indonesia, but this slightly larger species has a more globular shape with a less H/W ratio and stronger nodules of P1 and P2.

Regarding the number of spiral cords on the whorls, the new species weakly remembers *C. francocacii* Poppe, Tagaro & Dekker, 2006 from Philippines, but this similar in size species has a more elevated spire, thicker nodules on the spiral cords P1 and P2, a rounded periphery and only 5 thinner spiral cords on the base.

Also considering the number of spiral cords, *C. stegos* n. sp. may be compared to *C. wilsii* Poppe, Tagaro & Dekker, 2006 from Philippines, but this species has a more elevated, slightly coeloconoidal spire, a significant keel on P2, much thicker, more spaced nodules on all the spiral cords and only at most 5 spiral cords on the base.

Etymology. Urn (Greek : στέγος), used as a noun in apposition - with reference to the shape of the shell.

Calliotropis cooperculum n. sp.
Figs 190-193, Table 29

Type material. Holotype (5.0 x 7.4 mm) MNHN (9888). Paratypes : 4 MNHN (9889), 1 C.Vilvens coll.

Type locality. Fiji, BORDAU 1, stn DW1485, 19°03'S, 178°30'W, 700-707 m.

Material examined. Fiji, BORDAU 1: stn DW1413, 16°10'S, 179°24'W, 669-676 m., 1 dd. - Stn DW1485, 19°03'S, 178°30'W, 700-707 m, 6 dd, 4 dd sub (with holotype and paratypes). - Stn DW1488, 19°01'S, 178°25'W, 500-516 m, 1 dd. - Stn CP1490, 18°51'S, 178°32'W, 785-820 m, 4 dd.

Distribution. Fiji, 516-785 m.

Diagnosis. A small nacreous white *Calliotropis* species with a rather depressed, slightly coeloconoidal spire, 2 granular spiral cords on spire whorls and 4 more or less spiny, different in size, spiral cords on last whorl; base with 6 thin spiral cords; broad umbilicus with one thin spiral cord inside.

Description. *Shell* of small size for the genus (height up to 5.0 mm, width up to 7.4 mm), much broader than high, rather thin, slightly coeloconoidal; spire rather depressed, height 0.6x to 0.7x width, 3.6x to 5.0x aperture height; broad umbilicus.

Protoconch of about 350 µm, of 1 whorl, glassy, bulbous, without clearly visible terminal varix.

Teleoconch up to 5 convex whorls, bearing up to 4 spiral granular cords different in size; nodules from cords produced by intersections with axial ribs; axial sculpture weakly visible on last whorl near nodules of spiral cords.

Suture visible, canaliculated.

First whorl convex, sculptured by about 15 prosocline,

smooth ribs; ribs first rather thin, with interspace between ribs about 2x broader than ribs; after mid whorl, ribs much thicker, interspace between ribs at least 3x broader than ribs; primary cords P1 and P2 appearing almost immediately, weak but distinct, similar in size. On second whorl, P1 and P2 stronger, beads of cords bluntly sharp. On third whorl, pointed beads of P2 oriented at 45°, sharp beads of P1 almost vertically oriented; P3 emerging weakly from suture at end of whorl, granular, much weaker than P1 and P2. On fourth whorl, P1 slightly stronger than P2, both with sharp nodules well spaced; axial sculpture becoming obsolete except near beads. S1 appearing at end of fourth whorl or at begin of fifth, very thin, weakly granular. On fifth whorl, P1 stronger than P2, nodules of P2 from 1.5x to 2x more numerous than those of P1; P3 peripheral, with sharp beads horizontally oriented, twice more numerous than those of P2; beads of S1 sharp after mid whorl, almost similar to beads of P1 and P2 at end of whorl.

Aperture subelliptic; outer lip thin, meeting inner lip with an obtuse, marked angle.

Columella more or less straight, oblique, without tooth.

Base almost flat, with 6 thin granular spiral cords, innermost cord stronger, bordering umbilicus; distance between 5 outermost cords about 2x size of cords; axial ribs between spiral cords, connecting beads of all cords, distance between ribs similar in size to ribs.

Umbilicus very wide, diameter ca. 35% of shell width, deep, funnel shaped, with rather strong axial ribs and a very weak (sometimes even absent) spiral cord inside.

Colour of teleoconch and protoconch nacreous white.

Figures 214-235. Scale bar = 5 mm.

214-217. *Calliotropis ostrideslithos* n. sp., Solomon Islands, 453-542 m [SALOMON 1, stn CP1770].

214-215. Holotype MNHN (9894), 3.8 x 6.5 mm; **216-217.** Paratype MNHN (9895), 3.3 x 5.8 mm.

218-219. *C. bicarinata* (Schepman, 1908), holotype ZMA (3.08.059), Indonesia, 390 m [SIBOGA, stn 59], 4.0 x 6.0 mm.

220-221. *C. trieres* n. sp., holotype MNHN (9890), New Caledonia, 380-400 m [BATHUS 1, stn DW683], 2.9 x 4.3 mm.

222-223. *C. vilvensi* Poppe, Tagaro & Dekker, 2006, MNHN, Solomon Islands, 396-411 m [SALOMON 1, stn DW1762], 2.7 x 4.4 mm.

224-227. *C. pheidole* n. sp.

224-225. Holotype MNHN (9898), Fiji, 500-516 m [BORDAU 1, stn DW1488], 2.6 x 4.8 mm; **226-227.** MNHN, Tonga, 482-504 m [BORDAU 2, DW1615], 3.1 x 5.1 mm.

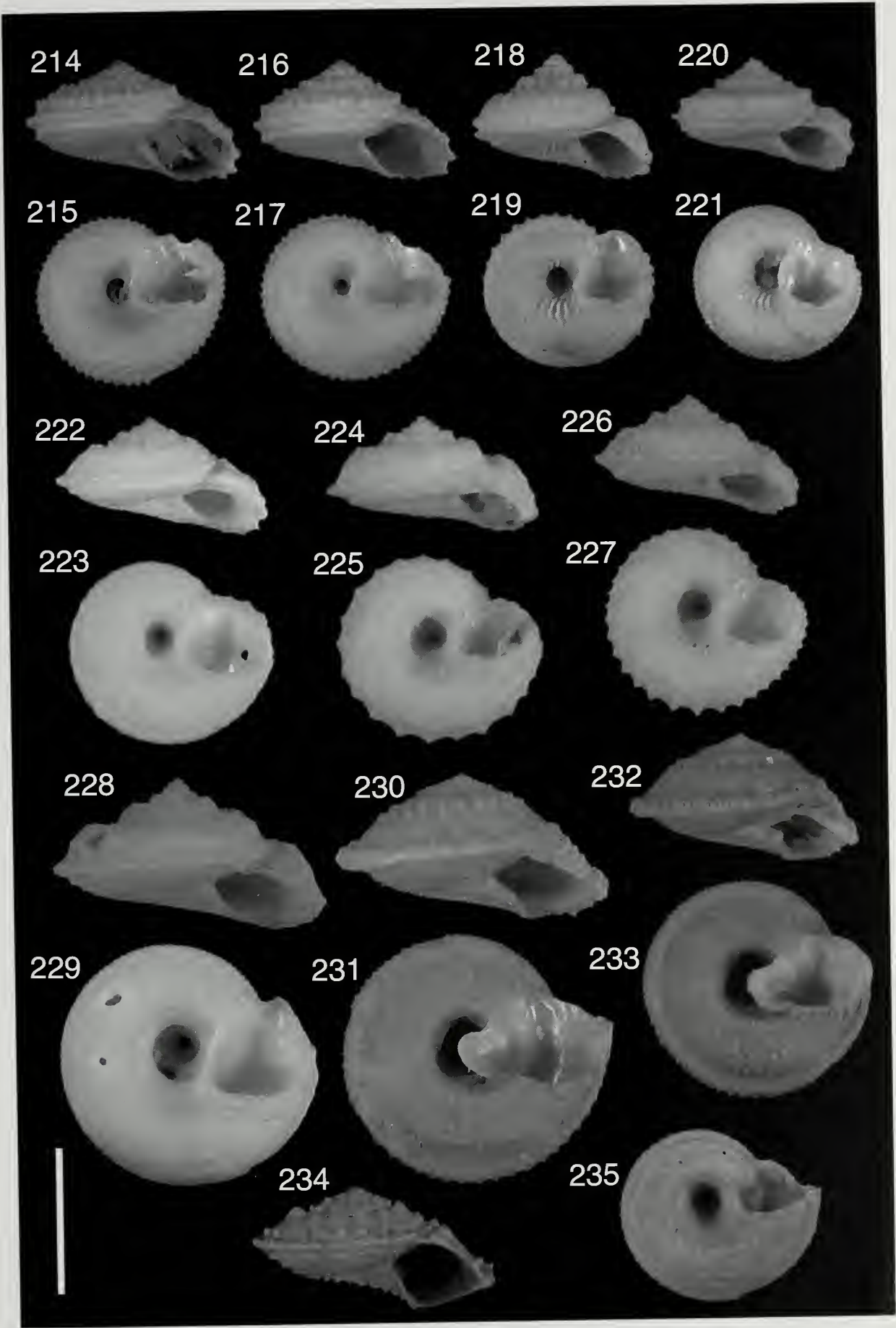
228-229. *C. siphaios* n. sp., holotype MNHN (9892), Tonga, 500 m [BORDAU 2, DW1549], 5.2 x 8.5 mm.

230-233. *C. nomismasimilis* n. sp.

230-231. Holotype MNHN (9896), Solomon Islands, 387 m [SALOMON 1, stn CP1786], 5.2 x 9.1 mm;

232-233. MNHN, Solomon Islands, 381-383 m [SALOMON1, cp1837], 4.6 x 8.2 mm.

234-235. *C. spinulosa* (Schepman, 1908), syntype ZMA (3.08.058), Indonesia, 411 m [SIBOGA, stn 159], 4.3 x 8.8 mm.



	TW	H	W	HA	H/W	H/HA
holotype	5.0	5.0	7.4	1.0	0.68	5.00
paratype MNHN 1	5.0	4.9	7.2	1.1	0.68	4.45
paratype MNHN 2	4.8	4.2	6.6	1.1	0.64	3.82
paratype MNHN 3	4.9	4.1	6.6	1.1	0.62	3.73
paratype MNHN 4	4.9	4.5	6.6	1.1	0.68	4.09
paratype MNHN CV	4.7	4.3	6.3	1.2	0.68	3.58

Table 29. - *Calliotropis cooperculum* : Shells measurements in mm for types.

Discussion. *Calliotropis cooperculum* n. sp. shares a similar ontogeny of cords with *C. hysterea* n. sp. (Figs 134-137) from New Caledonia, but this similar in size species has a much higher spire, a conical shape, P1 and P2 similar in size and thicker, and more distinct basal spiral cords.

The new species is also rather close to *C. gemmulosa* (A.Adams, 1860) from Japan and Philippines, but, again, this similar in size species has a higher spire and spiral cords on whorls that are similar in size; moreover, the new species has thicker and fewer (only 3 or 4) basal spiral cords.

C. cooperculum n. sp. may be compared to *C. abyssicola* Rehder & Ladd, 1973 from central Pacific, but this species is taller for a same number of whorls, has a cyrtconoidal shape and similar in size spiral cords on the whorls.

The new species may also be compared to some forms of the variable *C. calatha* (Dall, 1927) from western Atlantic, but this more or less similar in size species has a more elevated spire and only 3 or 4 spiral cords on the base.

Etymology. Cover (Latin), used as a noun in apposition - after the shape of the spire of the shell remembering the cover of a pan.

Calliotropis trieres n. sp.
Figs 220-221, Table 30

Type material. Holotype (2.9 x 4.3 mm) MNHN (9890). Paratypes : 8 MNHN (9891), 2 NMNZ (M.273555), 1 C.Vilvens coll.

Type locality. New Caledonia, BATHUS 1, stn DW683, 20°35'S, 165°07'E, 380-400 m.

Material examined. New Caledonia. BATHUS 1: stn DW683, 20°35'S, 165°07'E, 380-400 m, 24 dd (with holotype and paratypes), 8 dd juv. - BATHUS 3: stn DW838, 23°01'S, 166°56'E, 400-402 m, 1 dd.

Distribution. New Caledonia, 400 m.

Diagnosis. A small, depressed, nacreous white *Calliotropis* species with a more or less conical spire, a small protoconch, 2 granular spiral cords on spire

whorls, the adapical with sharp beads and the other making a keel; an additional peripheral spiral cord on last whorl giving a bicarinate shape to the shell; base with 4 granular spiral cords; broad umbilicus with one spiral cord inside.

Description. *Shell* of small size for the genus (height up to 2.9 mm, width up to 4.5 mm), much broader than high, rather thin, conical to slightly cyrtconoidal; spire depressed, height from 0.6x to 0.7x width, 3.0x to 4.3x aperture height; broad umbilicus.

Protoconch from 200 to 250 µm, of 1 whorl, glassy, without terminal varix.

Teleoconch up to 4.5 slightly convex whorls, bearing up to 3 spiral granular cords; nodules from cords produced by intersections with axial ribs on first whorls; axial sculpture on spire whorls, weaker on last whorl.

Suture visible, canaliculated.

First whorl convex, sculptured by about 15 weakly prosocline smooth ribs; interspace between ribs about 2x broader than ribs; primary cord P3 appearing almost immediately, P1 appearing half a whorl later, weaker than p3. On second whorl, P3 stronger than P1; beads of P3 strong and sharp. On third whorl, beads of P1 and P3 sharp, beads of P1 1.5x more numerous than beads of P3; beads of P1 almost vertically oriented; area between P1 and P3 more or less straight, P3 making keel; axial ribs stil connecting beads of cords, but becoming weaker. On fourth whorl, P4 emerging weakly from suture, granular, with beads smaller than beads of P1; P2 absent; axial sculpture obsolete. On last whorl, P4 peripheral, making a second keel, with beads slightly smaller and more numerous than those of P3; P3 more or less median between P1 and P4.

Aperture subcircular, inclined backward; outer lip thin, meeting inner lip without angle; inner lip flanged in a curving arc covering about a quarter of umbilicus. Columella almost straight, oblique, without tooth.

Base moderately convex, with 4 granular spiral cords; distance between cords similar in size to cords; weak, low axial ribs between spiral cords, connecting beads of all cords, distance between ribs similar in size to ribs.

Umbilicus wide, diameter measuring ca. 30% of shell width, deep, funnel shaped, with gently sloping walls; strong, lamellose, widely spaced, axial ribs and 1

granular spiral cord inside.
Colour of teleoconch nacreous white; protoconch translucent.

	TW	H	W	HA	H/W	H/HA
holotype	4.5	2.9	4.3	0.7	0.67	4.14
paratype MNHN 1	4.4	2.6	4.5	0.6	0.58	4.33
paratype MNHN 2	4.4	2.8	4.0	0.7	0.70	4.00
paratype MNHN 3	4.3	2.5	4.1	0.7	0.61	3.57
paratype MNHN 4	4.1	2.4	4.1	0.7	0.59	3.43
paratype MNHN 5	4.3	2.4	3.8	0.7	0.63	3.43
paratype NMNZ 1	4.1	2.4	3.9	0.8	0.62	2.67

Table 30. - *Calliotropis trieres* : Shells measurements in mm for largest types.

Discussion. *Calliotropis trieres* n. sp. is rather close to *C. ostrideslithos* n. sp. (Figs 214-217) from Solomon Islands, but this slightly broader species has a larger protoconch, stronger beads on P3, 3 spiral cords and thinner, more crowded axial threads within the umbilicus.

The new species may also remember *C. cooperculum* n. sp. (Figs 190-193) from Fiji, but this larger species has a larger protoconch, stronger and sharper beads on P1, no keel at P3, a concave (not straight) area between P1 and P3 and a not inclined aperture.

C. trieres n. sp. is may be compared to *C. carinata* Jansen, 1994 (Figs 184-185) from Eastern Australia, but this larger species has a more elevated spire, much thinner spiral cors ont the whorls and has no spiral cors within the umbilicus.

Etymology. Ancient trireme (Greek : τριρης), used as a noun in apposition - with reference to the keeled shape of the shell, remembering the shape of ancient warships.

Calliotropis vilvensi Poppe, Tagaro & Dekker, 2006
Figs 222-223

Calliotropis vilvensi Poppe, Tagaro & Dekker, 2006: 61, pl. 24, fig. 2-3. Type locality: Philippines, Balicasag, 9°28.6'N, 123°40'E, 470-566 m.

Material examined. Solomon Islands. SALOMON 1: stn DW1741, 11°29.1'S, 159°57.4'E, 557-655 m, 1 dd. - Stn DW1762, 8°39.9'S, 160°03.9'E, 396-411 m, 2 dd. - Stn DW1825, 9°50.5'S, 160°58.0'E, 340-391 m, 2 dd. - Stn DW1835, 10°10.2'S, 161°23.5'E, 464-482 m, 1 dd.

Indonesia. KARUBAR: stn DW03, 05°48'S, 132°13'E, 278-301 m, 1 dd & 1 dd sub.

New Caledonia. BIOCAL: stn DW77, 22°15'S, 167°15'E, 680-700 m, 3 dd.

Distribution. Philippines, 470-566 m (Poppe et al., 2006); Indonesia, 680-700 m: south-western Pacific

(from Solomon Islands to New Caledonia), 391-680 m.

Remarks. The specimens of these new records match perfectly the original description of this Philippine species, giving to it a wide but disjoint distribution. Additionnal new material will maybe fill the gaps between the different parts. See discussion under *C. pheidole* n. sp.

Calliotropis siphaeos n. sp.
Figs 228-229, Table 31

Type material. Holotype (5.2 x 8.5 mm) MNHN (9892). Paratypes : 2 MNHN (9893).

Type locality. Tonga, BORDAU 2, DW1549, 20°38'S, 175°00'W, 500 m.

Material examined. Tonga. BORDAU 2: DW1549, 20°38'S, 175°00'W, 500 m, 4 dd (with holotype and paratypes), 4 dd sub. - Stn DW1520, 21°25'S, 175°03'W, 447-450 m, 1 dd. - **Fiji.** BORDAU 1: stn DW1486, 19°01'S, 178°26'W, 395-540 m, 2 dd, 2 dd sub. - Stn DW1488, 19°01'S, 178°25'W, 500-516 m, 1 dd.

Distribution. South-western Pacific (from Fiji to Tonga), 450-500 m.

Diagnosis. A whitish ochre *Calliotropis* species of medium size, with a slightly cyrtoconoidal, depressed spire, an angulated periphery and up to 3 granular spiral cords on whorls, the abapical cord producing a strong keel; base with at least 5 spiral cords; broad umbilicus without spiral cord inside.

Description. *Shell* of small size for the genus (height up to 5.2, width up to 8.5 mm), much broader than high, slightly cyrtoconoidal; spire depressed, height about 0.6x width, 3.4x to 5.8x aperture height; broad umbilicus.

Protoconch from 250 to 300 µm, of 1 whorl, without terminal varix.

Teleoconch up to 4.9 moderately convex whorls, bearing 2 main spiral granular cords different in size and a secondary cord between them on last whorls; primary axial sculpture visible on all whorls; secondary axial sculpture in abapical area of last whorl.

Suture impressed, weakly canaliculated.

First whorl convex, sculptured by about 18 prosocline smooth ribs; interspace between ribs about 1.5x broader than ribs; primary cord P1 appearing immediately, granular. On second whorl, P1 much stronger, with bluntly sharp beads; interspace between ribs 2.5x broader than ribs. On third whorl, beads of P1 stronger and sharper, with large interspace between them; P1 making shoulder; axial ribs stronger near nodules; P4 emerging from suture at end of whorl, granular; beads of P4 a smaller and more numerous than nodules of P1; P2 and P3 absent. On fourth

whorl, S1 appearing at same distance from P1 and P4, weak, granular; axial ribs more prosocline; strongly prosocline secondary axial ribs appearing in abapical part. On last whorl, P4 peripheral, making keel; beads of P4 vertically elongated, 4x more numerous than those of P1.

Aperture subquadrangular; outer lip rather thin, with an abapical angulation and meeting inner lip without angle or with an obtuse, poorly marked angle.

Columella curved, oblique, without tooth.

Base almost flat to slightly convex, with 5 granular spiral cords, sometimes with 1 or 2 thin additional cords; distance between cords of about 1.5x size of cords; thin threads between spiral cords, connecting beads of cords.

Umbilicus wide, diameter ca. 35% of shell width, deep, funnel shaped, with moderately steep sloping walls, widely spaced axial ribs and without spiral cord inside.

Colour of teleoconch whitish ochre; protoconch white.

	TW	H	W	HA	H/W	H/HA
holotype	4.9	5.2	8.5	0.9	0.61	5.78
paratype MNHN 1	4.8	4.4	8.0	1.3	0.55	3.38
paratype MNHN 2	4.7	4.0	6.5	1.1	0.62	3.64

Table 31. - *Calliotropis siphaeos* : Shells measurements in mm for types.

Discussion. The new species is close to *Calliotropis vilvensi* Poppe, Tagaro & Dekker, 2006 (Figs 222-223) from the Philippines and *C. pheidole* n. sp. (Figs 224-227) from Fiji and Tonga, but these two smaller species have less numerous spiral cords on the base (4 at most) and at least 2 spiral cords inside the umbilicus.

C. siphaeos n. sp. remembers *C. eucheloides* Marshall, 1979 (Figs 138-155, 160-161) from Kermadec Islands, New Caledonia and Philippines, but this slightly larger species differs by many features as a more elevated spire, more numerous spiral cords on the whorls and a columellar tooth.

Etymology. Buckwheat pancake (Greek : σιφατος), used as a noun in apposition - with reference to the depressed spire of the shell.

Calliotropis calcarata (Schepman, 1908)
Figs 156-157, 162-167

Solariellopsis calcarata Schepman, 1908: 53-54, pl. IV, fig. 2., pl. IX, fig. 10. Type locality: South-eastern Indonesia, 10°27.9'S, 123°28.7'E, 216 m.

Other reference :

Calliotropis calcarata - Poppe, Tagaro & Dekker, 2006: 63, pl. 26, fig. 2.

Material examined. Indonesia. KARUBAR: stn DW15, 05°17'S, 132°41'E, 212-221 m, 3 dd. - Stn

DW64, 09°13'S, 131°31'E, 179-180 m, 1 dd. - Stn CP85, 09°22'S, 131°14'E, 240-245 m, 1 dd.

Solomon Islands. SALOMON 1: stn DW1768, 8°21.4'S, 160°41.8'E, 194-286 m, 1 dd. - Stn DW1855, 9°46.4'S, 160°52.9'E, 252-263 m, 1 dd.

Distribution. Indonesia, 180-240 m (range computed using also data of Schepman, 1908) and Philippines, 150-210 m (Poppe, 2006).

Remarks. This species was described from Indonesia and the records in Solomon Islands are new. Poppe et al. also found this species in Philippines (2006). This species seems to have a rather wide distribution, provisionally disjoint.

Calliotropis ostrideslithos n. sp.
Figs 214-217, Table 32

Type material. Holotype (3.8 x 6.5 mm) MNHN (9894). Paratypes : 4 MNHN (9895), 1 C.Vilvens coll.

Type locality. Solomon Islands, SALOMON 1, stn CP1770, 8°19.6'S, 160°38.7'E, 453-542 m.

Material examined. Solomon Islands. SALOMON 1: stn CP1751, 9°10.4'S, 159°53'E, 749-799 m, 5 dd. - Stn CP1770, 8°19.6'S, 160°38.7'E, 453-542 m, 19 lv (with holotype and paratypes), 3 dd juv.

Distribution. Solomon Islands, alive in 453-542 m, shells in 542-749 m.

Diagnosis. A small, depressed, off-white *Calliotropis* species with a slightly cyrtokonoidal spire, 2 granular, sharp spiral cords on spire whorls and 4 or 5 different in size spiral cords on last whorl; base with 5 granular spiral cords; broad umbilicus with 3 thin spiral cords inside.

Description. *Shell* of small size for the genus (height up to 3.8 mm, width up to 6.5 mm), much broader than high, rather thin, slightly cyrtokonoidal; spire rather depressed, height about 0.6x width, 3.4x to 4.1x aperture height; broad umbilicus.

Protoconch of about 300 µm, of 1 whorl, glassy, without clearly visible terminal varix.

Teleoconch up to 4.7 convex whorls, bearing up to 4, sometimes 5, different in size spiral granular cords; nodules from cords produced by intersections with axial ribs on first whorls; axial sculpture weakly visible on last whorl near nodules of spiral cords.

Suture visible, canaliculated.

First whorl convex, sculptured by about 20 prosocline smooth ribs; interspace between ribs about 1.5x broader than ribs; primary cords P1 and P3 appearing almost immediately, weak but distinct, similar in size. On second whorl, P1 and P3 stronger; beads rounded, connected by axial ribs; interspace between ribs 2x

broader than ribs. On third whorl, P3 stronger than P1; beads of P1 and P3 sharp, beads of P3 oriented at 45°, beads of P1 almost vertically oriented; P4 emerging clearly from suture at begin of whorl, granular, similar in size to P3; P2 absent; axial ribs connecting beads of P3 and P4, but connecting no more those of P1 and P3. On fourth whorl, P1 as strong as P3, both with sharp nodules well spaced; S1 appearing, weaker than P1 and P3; beads of P4 more numerous than those of P3 (ratio of 3 beads of P3 for 4 beads of P4); axial sculpture obsolete except near beads. On last whorl, P4 peripheral; a tertiary spiral cord may appear between S1 and P3.

Aperture subelliptic, horizontally elongated; outer lip thin, meeting inner lip with an obtuse, poorly marked angle; inner lip flanged in a curving arc covering about a quarter of umbilicus.

Columella curved at first third, oblique, without tooth.

Base moderately convex, with 4 main granular spiral cords, a fifth weaker cord often present between two outermost cords; distance between cords more or less similar in size to cords; weak, low axial ribs between spiral cords, connecting beads of all cords, distance between ribs from 1x to 1.5 size of ribs.

Umbilicus wide, diameter ca. 35% of shell width, deep, funnel shaped, with gently sloping walls, thin axial ribs and 3 weak, granular spiral cords inside.

Colour of teleoconch and protoconch nacreous off-white.

	TW	H	W	HA	H/W	H/HA
holotype	4.7	3.8	6.5	1.1	0.58	3.45
paratype MNHN 1	4.4	3.3	5.8	0.9	0.57	3.67
paratype MNHN 2	4.4	3.3	6	0.8	0.55	4.13
paratype MNHN 3	4.4	3.1	5.6	0.9	0.55	3.44
paratype MNHN 4	4.3	3.4	6.0	0.9	0.57	3.78
paratype MNHN 5	4.4	3.8	6.0	1.0	0.63	3.80

Table 32. - *Calliotropis ostrideslithos* : Shells measurements in mm for types.

Discussion. *Calliotropis ostrideslithos* n. sp. is rather close to *C. cooperculum* n. sp. (Figs 190-193) but this smaller species has a more elevated spire giving a very different shape to the shell, 6 weaker, low spiral cords on the base and only one spiral cord inside the umbilicus.

Etymology. Mother of pearl (Greek : οστρίδης λιθος), used as a noun in apposition - with reference to the nacreous colour of the shell.

Calliotropis nomismasimilis n. sp.
Figs 230-233, Table 33

Type material. Holotype (5.2 x 9.1 mm) MNHN (9896). Paratypes : 3 MNHN (9897).

Type locality. Solomon Islands, SALOMON 1, stn CP1786, 9°21.3'S, 160°24.6'E, 387 m.

Material examined. Solomon Islands. SALOMON 1: stn CP1786, 9°21.3'S, 160°24.6'E, 387 m, 4 dd (holotype and paratypes). 3 dd sub. 3 dd juv. - Stn CP1837, 10°12.8'S, 161°28.6'E, 381-383 m, 2 lv, 2dd, 1 lv sub, 2 lv juv.

Distribution. Solomon Islands, alive in 381-383 m, shells in 383-387 m.

Diagnosis. A hazel beige *Calliotropis* species of small size, with a cyrtokonoidal, depressed spire, an angulated periphery and to 3 granular spiral cords on last whorls, the two abapical cords very close, making a strong keel on last whorl; base with 6 close granular

spiral cords; broad umbilicus without spiral cord inside.

Description. *Shell* of small size for the genus (height up to 5.2 mm, width up to 9.1 mm), much broader than high, cyrtocoid; spire depressed, height from 0.5x to 0.6x width, 4.1x to 4.7x aperture height; broad umbilicus.

Protoconch of from 280 to 300 µm, of 1 whorl, without terminal varix.

Teleoconch up to 4.8 whorls, first whorls moderately convex and last whorls slightly concave, with 2 spiral granular cords different in size on first whorls and 3 cords on last whorls; primary axial sculpture only visible on first whorls.

Suture deeply canaliculated.

First whorl convex, sculptured by about 20 slightly prosocline smooth ribs; interspace between ribs from 2x to 2.5x broader than ribs; primary cords P1 and P3 appearing almost immediately, granular; nodules from cords produced by intersections with axial ribs; P3 slightly stronger than P1. On second whorl, beads of both cords stronger and sharp, beads of P3 thicker than those of P1; axial ribs weaker. On third whorl, beads of P1 and P3 broader and bluntly sharp; distance between beads about 2x broader than size of

beads; P4 emerging partially from suture at mid whorl, lamellose; beads of P4 scaly, smaller and 6x more numerous than nodules of P3; P2 absent; axial ribs disappearing. On fourth whorl, beads of P1 almost vertically oriented; P4 fully emerging from suture; no interspace between P3 and P4; bead of P4 smaller than those of P1, bluntly sharp, scaly. On last whorl, P4 peripheral, making keel; beads of P4 about 3x more numerous than nodules of P3, vertically elongated; two, sometimes three, granular tertiary cords appearing after mid whorl between P1 and P3.

Aperture subquadrangular; outer lip thin, with an submedian angle corresponding to exterior P3 and P4, meeting inner lip with an angle of about 120°.

Columella curved at first third, oblique, with 1 basal tooth, expanding into umbilicus.

Base moderately convex, with an exterior smooth area and 6 close granular spiral cords; distance between cords of half size of cords; most interior cord stronger, bordering umbilicus; rather thick axial ribs, connecting beads of cords.

Umbilicus wide, diameter ca. 30% of shell width, deep, funnel shaped, with rather steep sloping walls, undistinct crowded thin axial ribs and without spiral cord inside.

Colour of teleoconch and protoconch hazel beige.

	TW	H	W	HA	H/W	H/HA
holotype	4.8	5.2	9.1	1.1	0.57	4.73
paratype MNHN 1	4.7	4.9	8.9	1.2	0.55	4.08
paratype MNHN 2	4.7	4.8	8.9	1.1	0.54	4.36
paratype MNHN 3	4.7	4.8	7.9	1.1	0.61	4.36

Table 33. - *Calliotropis nomismasimilis* : Shells measurements in mm for types.

Discussion. The new species is rather close to *Calliotropis nomisma* n. sp. (Figs 236-237) from Indonesia, but this species has a spiral cord P3 disappearing on last whorls, no tertiary cords and a very different base that is smooth except a spiral cord around the umbilicus.

See discussion under *C. nomisma* n. sp. for remarks on other close species.

Etymology. Close to *nomisma* (Latin and Greek) - with reference to closest species *C. nomisma* n. sp.

Figures 236-251. Scale bar = 5 mm.

236-237. *Calliotropis nomisma* n. sp., holotype MNHN (9884), Indonesia, 356-368 m [KARUBAR, stn CP69], 9.7 x 17.6 mm.

238-241. *C. nux* n. sp., Solomon Islands, 570-756 m [SALOMON I, stn CP1772].

238-239. Holotype MNHN (9873), 11.0 x 14.8 mm; **239-241.** Paratype MNHN, 7.7 x 11.7 mm.

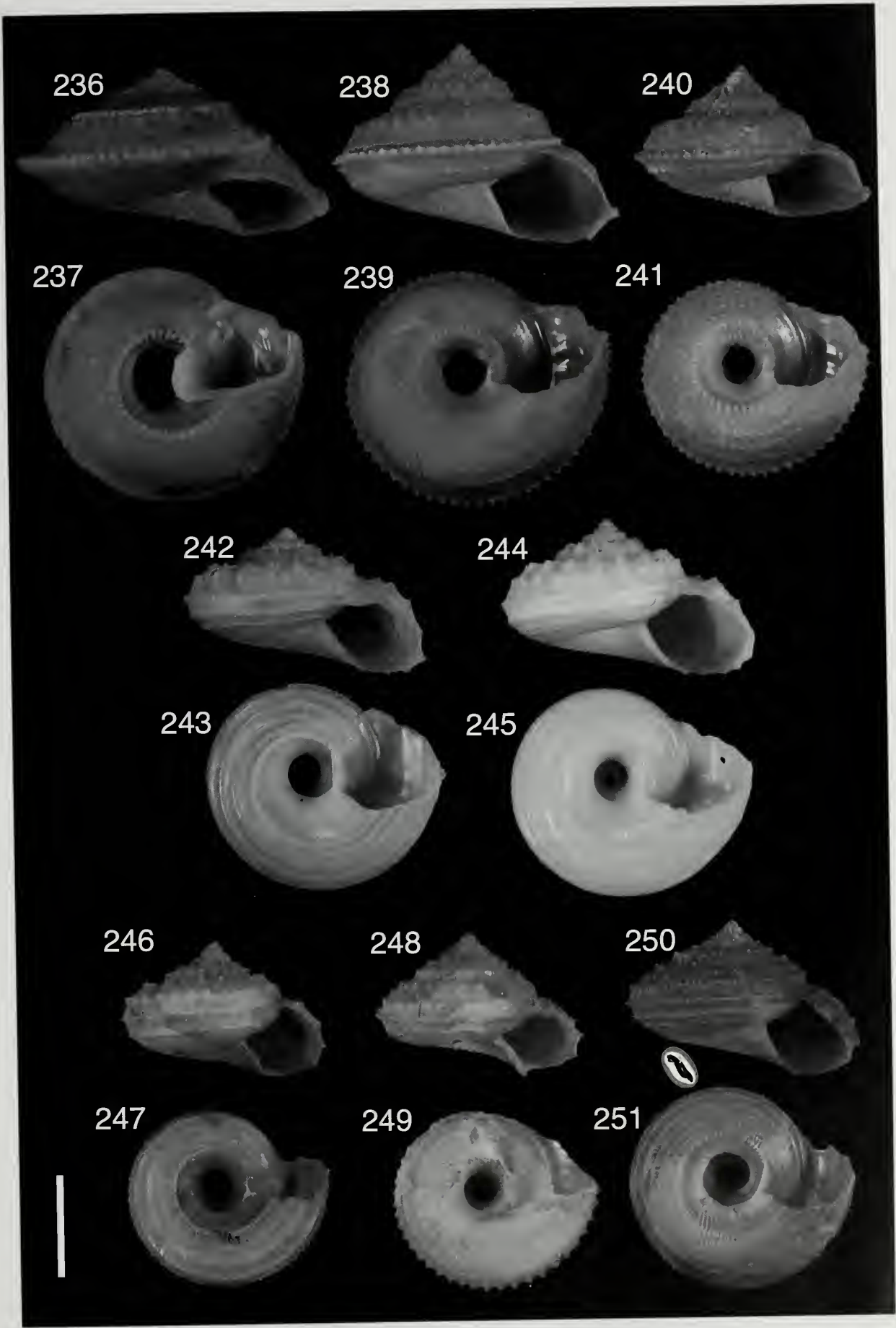
242-245. *C. elephas* n. sp., New Caledonia, 680-700 m [BIOCAL, stn DW51].

242-243. Holotype MNHN (9879), 7.4 x 12.1 mm; **244-245.** Paratype MNHN (9880), 7.7 x 11.4 mm.

246-247. *C. concavospira* (Schepman, 1908), syntype ZMA (3.08.062), Indonesia, 835 m, 6.0 x 8.7 mm.

248-251. *C. denticulus* n. sp., New Caledonia.

248-249. Holotype MNHN (9855), 908 m [BATHUS 3: stn CP844], 7.0 x 9.5 mm; **250-251.** Paratype MNHN (9857), [BATHUS 2/MUSORSTOM], 7.4 x 11.6 mm.



Calliotropis spinulosa (Schepman, 1908)
Figs 234-235

Solariellopsis spinulosa Schepman, 1908: 55-56, pl. IV, fig. 5. Type locality: Indonesia, 0°59.1'S, 129°48.8'E, 411 m.
Other reference :
Calliotropis spinulosa - Vilvens, 2006: fig. 36-37.

Material examined. Indonesia. KARUBAR: stn DW13, 05°26'S, 132°38'E, 417-425 m, 1 dd & 2 dd juv. - Stn DW44, 07°52'S, 132°48'E, 291-295 m, 1 dd juv.

Distribution. Indonesia, 295-417 m (range computed using also data of Schepman, 1908).

Calliotropis pheidole n. sp.
Figs 224-227, Table 34

Type material. Holotype (2.6 x 4.8 mm) MNHN (9898). Paratypes : 4 MNHN (9899).

Type locality. Fiji, BORDAU 1, stn DW1488, 19°01'S, 178°25'W, 500-516 m.

Material examined. Fiji. BORDAU 1: stn DW1488, 19°01'S, 178°25'W, 500-516 m, 5 dd (with holotype and paratypes), 1 dd sub.
Tonga. BORDAU 2: DW1615, 23°03'S, 175°53'W, 482-504 m, 1 dd.

Distribution. South-western Pacific (from Fiji to Tonga), 500-504 m.

Diagnosis. A whitish ochre *Calliotropis* species of small size, with a slightly cyrtconoidal, depressed spire, an angulated periphery and 2 granular spiral cords on whorls; the abapical cord producing a strong keel and weak additional spiral cords appearing on last whorl; base with 3 flat spiral cords; broad umbilicus with 2 or 3 spiral cords inside.

Description. *Shell* of small size for the genus (height up to 2.7, width up to 5.3 mm), much broader than high, slightly cyrtconoidal; spire depressed, height 0.5x to 0.6x width, 3.4x to 4.8 x aperture height; broad umbilicus.
Protoconch of from 200 to 250 µm, of 1 whorl, without terminal varix.
Teleoconch up to 4.7 moderately convex whorls with 2 main spiral granular cords different in size; axial sculpture on first whorls, quickly obsolete on next whorls; secondary axial sculpture in abapical area of last whorl.
Suture impressed, weakly canaliculated.
First whorl convex, sculptured by about 20 prosocline smooth, low, poorly marked ribs; interspace between ribs about 1x broader than ribs; primary cord P1 appearing immediately, weak, granular. On second whorl, P1 stronger; interspace between axial ribs 2x broader than ribs. On third whorl, beads of P1 becoming strong nodules, with large interspace between them; P1 making shoulder; axial ribs obsolete, except near nodules; interspace between ribs 3x broader than ribs; P4 emerging from suture at end of whorl, granular; beads of P4 a bit smaller and slightly more numerous than nodules of P1; P2 and P3 absent. On next whorls, weak secondary axial sculpture appearing in abapical part. On last whorl, P4 peripheral, making keel; 2 or 3 weak tertiary spiral cords appearing in area between P1 and P4; one tertiary cord appearing between suture and P1.
Aperture subcircular, inclined backward; outer lip thickened, meeting inner lip without any angle.
Columella slightly curved, oblique, without tooth.
Base almost flat to slightly convex, with 3 low, broad, spiral cords; distance between cords of about 1.5x size of cords; thin ribs may be visible between spiral cords, not connecting beads of cords.
Umbilicus wide, diameter ca. 30% of shell width, deep, funnel shaped, with rather steep sloping walls, with thin, not crowded, axial ribs and with 2, sometimes 3, spiral cords inside.
Colour of protoconch and first whorls of teleoconch ochre; last whorls off white.

	TW	H	W	HA	H/W	H/HA
holotype	4.5	2.6	4.8	0.7	0.54	3.71
paratype MNHN 1	4.7	2.7	5.3	0.7	0.51	3.86
paratype MNHN 2	4.3	2.4	5.0	0.7	0.48	3.43
paratype MNHN 3	4.0	2.2	4.1	0.5	0.54	4.40
paratype MNHN 4	4.3	2.4	4.1	0.5	0.59	4.80

Table 34. - *Calliotropis pheidole* : Shells measurements in mm for types.

Discussion. The new species is close to *Calliotropis vilvensi* Poppe, Tagaro & Dekker, 2006 (Figs 222-223) from the Philippines, but this similar in size species is much more depressed, has a P3 spiral cord peripheral on the last whorl and a spiral cord P4 only

visible on this last whorl (instead of an absent P3 and a peripheral P4 for the new species). Additional material from various Indo-Pacific areas, could prove that intermediate forms exist and that there is only one species with a very large distribution.

Etymology. Thrifty (Greek : φειδωλος) - with reference to low weak cords that appear late.

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Provisional list of Recent *Calliotropis* species of the Indo-Pacific area - release 2007.

Species	distribution
<i>Calliotropis abyssicola</i> Rehder & Ladd, 1973	Central Pacific, 895-1763 m
<i>Calliotropis acherontis</i> Marshall, 1979	South-western Pacific (from eastern Australia to Solomon Islands, New Caledonia and Fiji); south-western Indian Ocean, 500-770 m
<i>Calliotropis annonaformis</i> Lee & Wu, 2001	Pratas Islands, 400-500 m
<i>Calliotropis asphales</i> n. sp.	Solomon Islands, 387-749 m
<i>Calliotropis babylonia</i> Vilvens, 2006	Réunion Island, 1150-1180 m
<i>Calliotropis basileus</i> Vilvens, 2004	Fiji, 560-750 m, and New Caledonia, 830-950 m
<i>Calliotropis bicarinata</i> (Schepman, 1908)	Indonesia, 390 m
<i>Calliotropis blacki</i> Marshall, 1979	South-western Pacific (from New Caledonia to Fiji and Kermadec Is.), 549-720 m
<i>Calliotropis boucheti</i> Poppe, Tagaro & Dekker, 2006	Philippines, 640-770 m and Taiwan, 554 m.
<i>Calliotropis bucina</i> Vilvens, 2006	Réunion Island, 270-310 m; Mayotte Island, 300-350 m; Solomon Islands, 281-513 m; Indonesia, 295-417 m
<i>Calliotropis calcarata</i> (Schepman, 1908)	Indonesia, 180-240 m and Philippines, 150-210 m
<i>Calliotropis canaliculata</i> Jansen, 1994	South-eastern Australia, 841-1700 m
<i>Calliotropis carinata</i> Jansen, 1994	Eastern Australia, 322-1097 m
<i>Calliotropis chalkeie</i> n. sp.	South-western Pacific (from Solomon Is. to New Caledonia and Fiji), 707-1360 m
<i>Calliotropis chenoderma</i> Barnard, 1963	South Africa, 86-228 m
<i>Calliotropis chumi</i> (von Martens, 1904)	Indonesia, 660 m
<i>Calliotropis concavospira</i> (Schepman, 1908)	Indonesia, 835-883 m
<i>Calliotropis conoeides</i> n. sp.	Solomon Islands, 1203-1327 m
<i>Calliotropis cooperculum</i> n. sp.	Fiji, 516-785 m
<i>Calliotropis coopertorium</i> n. sp.	South-western Pacific (from Vanuatu to Fiji), shells in 210-497 m.
<i>Calliotropis crystallophora</i> Marshall, 1979	South-western Pacific (from New Caledonia to Tonga), 495-920 m
<i>Calliotropis cycloeides</i> n. sp.	South-western Pacific (from Solomon Islands to Fiji), 371-403 m
<i>Calliotropis cynee</i> n. sp.	Indonesia, Tanimbar Islands, 891-1244 m
<i>Calliotropis delli</i> Marshall, 1979	South-western Pacific (from Chesterfield to Tonga), 350-490 m
<i>Calliotropis denticulus</i> n. sp.	New Caledonia, 500-2160 m
<i>Calliotropis derbiosa</i> Vilvens, 2004	South-western Pacific (from New Caledonia to Fiji), 800-1230 m
<i>Calliotropis dicrous</i> n. sp.	Solomon Islands, 461-749 m
<i>Calliotropis echidna</i> Jansen, 1994	Eastern Australia and New Caledonia, 115-296 m
<i>Calliotropis echidnoides</i> n. sp.	South-western Pacific (from New Caledonia to Tonga), 248-344 m
<i>Calliotropis elephas</i> n. sp.	New Caledonia, 405-2040 m
<i>Calliotropis ericius</i> Vilvens, 2006	Mayotte Is., 1300-1480 m and Réunion Is., 1600 m

<i>Calliotropis encheloides</i> Marshall, 1979	South-western Pacific (from Solomon Islands to Tonga), 276-510 m; Philippines, 150-300 m; Indonesia, 240-278 m; western Indian Ocean, 450 m
<i>Calliotropis excelsior</i> Vilvens, 2004	Fiji, 959-963 m and New Caledonia, 1000-1120 m
<i>Calliotropis francocacii</i> Poppe, Tagaro & Dekker, 2006	Philippines, 642-669 m
<i>Calliotropis galea</i> (Habe, 1953)	Japan, 100-200m
<i>Calliotropis gemmulosa</i> (A.Adams, 1860)	Japan and Philippines, 150-192 m
<i>Calliotropis glypta</i> (Watson, 1879)	South-western Pacific (from eastern Australia to Fiji), 660-835 m
<i>Calliotropis granolirata</i> (Sowerby, 1903)	South Africa, 457-1152 m
<i>Calliotropis grata</i> Thiele, 1925	East Africa, 693 m
<i>Calliotropis hataii</i> Rehder & Ladd, 1973	Central Pacific, 1617-1719 m; south-western Pacific, 1058-1280 m; south-western Indian Ocean, 3716 m
<i>Calliotropis helix</i> n. sp.	Taiwan, South China Sea, 790-904 m
<i>Calliotropis hondoensis</i> (Dall, 1919)	Japan, 1655 m
<i>Calliotropis hysterea</i> n. sp.	South-western Pacific (from Chesterfield to New Caledonia), 980-1080 m.
<i>Calliotropis infundibulum</i> (Watson, 1879)	Western Atlantic, 230-3259 m; Indian-Atlantic Ridge, 1965-2514 m; South Africa, 2750 m; Japan, 2000-2150 m; south-western Pacific, 2040-2315 m; New Zealand, 2080-2515 m
<i>Calliotropis keras</i> n. sp.	South-western Pacific, 600-650 m
<i>Calliotropis lamellifera</i> Jansen, 1994	Eastern Australia, 322-1330 m and New Caledonia area, 470-2040 m
<i>Calliotropis limbifera</i> (Schepman, 1908)	Indonesia, 522 m and south-western Pacific, 315-415 m
<i>Calliotropis malapascuensis</i> Poppe, Tagaro & Dekker, 2006	Philippines, 50-150 m
<i>Calliotropis metallica</i> (Wood-Mason & Alcock, 1891)	South Africa (Cape), 1024-2743 m, north-western Madagascar, 850-1125 m, East Africa (Aden), 1840 m, and central Indonesia, 918-2029 m.
<i>Calliotropis micraulax</i> Vilvens, 2004	South-western Pacific (from Chesterfield to Vanuatu), 780-1280 m.
<i>Calliotropis midwayensis</i> (Lan, 1990)	Midway Islands, 600 m and Taiwan, 876-904 m.
<i>Calliotropis minorusaitoi</i> Poppe, Tagaro & Dekker, 2006	Philippines, 2800 m
<i>Calliotropis multisquamosa</i> (Schepman, 1908)	Indonesia, 522 m and New Caledonia, 282-305 m
<i>Calliotropis muricata</i> (Schepman, 1908)	Indonesia, 390 m
<i>Calliotropis niasensis</i> Thiele, 1925	Indonesia, 132 m
<i>Calliotropis nomisma</i> n. sp.	Indonesia, 368-399 m
<i>Calliotropis nomismasimilis</i> n. sp.	Solomon Islands, 383-387 m
<i>Calliotropis nux</i> n. sp.	Solomon Islands, 575-624 m
<i>Calliotropis oregmene</i> n. sp.	Fiji, 707-820 m
<i>Calliotropis oros</i> n. sp.	South-western Pacific (from New Caledonia to Fiji), 443-591 m.
<i>Calliotropis oros marquisensis</i> n. ssp.	Marquesas Islands, 408-1150 m
<i>Calliotropis ostrideslithos</i> n. sp.	Solomon Islands, 542-749 m.
<i>Calliotropis otto</i> (Philippi, 1844)	Indonesia, 150-914 m
<i>Calliotropis pagodiformis</i> (Schepman, 1908)	Indonesia, 835-918 m and Solomon Islands, 461-749 m
<i>Calliotropis patula</i> (von Martens, 1904)	East Africa, 977-1019 m
<i>Calliotropis persculpta</i> (Sowerby, 1903)	South Africa, 804 m
<i>Calliotropis pheidole</i> n. sp.	South-western Pacific (from Fiji to Tonga), 500-504 m

<i>Calliotropis philippe</i> Poppe, Tagaro & Dekker, 2006	Philippines, 550-884 m
<i>Calliotropis pistis</i> n. sp.	New Caledonia area, 715-780 m.
<i>Calliotropis pompe</i> Barnard, 1963	Off Cape Point, 2706-3255 m
<i>Calliotropis powelli</i> Marshall, 1979	Kermadec Is., 256-402 m
<i>Calliotropis pykte</i> n. sp.	Tonga, 500 m
<i>Calliotropis pulchra</i> (Schepman, 1908)	Indonesia, 275-397 m
<i>Calliotropis pulvinaris</i> Vilvens, 2005	Western Madagascar, 550-800 m
<i>Calliotropis pyramoeides</i> n. sp.	South-western Pacific (New Caledonia area), 250-350 m.
<i>Calliotropis reticulina</i> (Dall, 1895)	Japan and Hawaii, "deep water"
<i>Calliotropis rostrum</i> n. sp.	South-western Pacific (New Caledonia and Coral Sea), 658-780 m.
<i>Calliotropis sagarinoi</i> Poppe, Tagaro & Dekker, 2006	Philippines, 164-176 m
<i>Calliotropis scalaris</i> Lee & Wu, 2001	South China Sea, 400-500 m; eastern Indonesia, 480-603 m; New Caledonia, 620-713 m.
<i>Calliotropis siphaios</i> n. sp.	South-western Pacific (from Fiji to Tonga), 450-500 m
<i>Calliotropis solariellaformis</i> Vilvens, 2006	Réunion Island, 1150-1180 m
<i>Calliotropis solomonensis</i> n. sp.	Solomon Islands, 263-396 m
<i>Calliotropis spinosa</i> Poppe, Tagaro & Dekker, 2006	Philippines, 842-865 m
<i>Calliotropis spinulosa</i> (Schepman, 1908)	Indonesia, 295-417 m
<i>Calliotropis stanyii</i> Poppe, Tagaro & Dekker, 2006	Philippines, 242-760 m and Solomon Islands, 513-564 m
<i>Calliotropis stegos</i> n. sp.	Solomon Islands, 451-749 m
<i>Calliotropis stellaris</i> Lee & Wu, 2001	Philippines, 300-400 m
<i>Calliotropis trieres</i> n. sp.	New Caledonia, 400 m.
<i>Calliotropis velata</i> Vilvens, 2006	Western Madagascar, 550-800 m
<i>Calliotropis vilvensi</i> Poppe, Tagaro & Dekker, 2006	Philippines, 470-566 m; Indonesia, 680-700 m; south-western Pacific (from Solomon Islands to New Caledonia), 391-680 m.
<i>Calliotropis virginiae</i> Poppe, Tagaro & Dekker, 2006	Philippines, 93-330 m
<i>Calliotropis wils</i> Poppe, Tagaro & Dekker, 2006	Philippines, 609-673 m
<i>Calliotropis yukikoe</i> Poppe, Tagaro & Dekker, 2006	Philippines, 255-647 m
<i>Calliotropis zone</i> n. sp.	South-western Pacific (from New Caledonia to Fiji), shells in 305-403 m;; Taiwan, 246 m.